Volume 94 Number 14

STEEL

Production • Processing • Distribution • Use

The Week in Perspective

WAGE RATES in the steel industry are back to the 1929 level, following the 10 per cent increase announced last week. Level of steel prices is 13 per cent below the figure five years ago. This apparent dislocation looms important in the minds of steel users with the result that a rush to specify for second quarter is developing. Thunder of a general price advance rumbles in the background. p. 10

FOUR UNION GROUPS being accorded recognition in automobile plants, by the President's order, the industry is getting set for guerrilla warfare between these conflicting organizations. p. 17

"THE WAGNER BILL is too unjust in intent and in letter to be susceptible of acceptable modification. It must be defeated in toto or completely rewritten from an entirely different approach to the labor problem." p. 20

STEEL HOUSES continue to attract the attention of designers and architects, a recent achievement in this field being a one-story five-room structure requiring 11 tons of steel. Cost: $2770. p. 30

RUGGED INDIVIDUALISM, once the birthright of the British steel industry, is going the way of American business independence, with recent voluntary approval of a "plan" for nationalization, regulation, and reorganization of English steel plants. p. 14

ARE YOU FAMILIAR with whortles? Black and yellow bortz? Flippers? Three-fourths pricked die plates? Patenting? They are all involved in the technique of wire drawing. p. 45

IN HOTEL KITCHENS stainless steel shows its ability in the form of a gas-fired cooker for handling entrees. It accommodates 120 casseroles per hour, stays clean and bright. p. 35

HENRY FORD forsakes his lone-wolf role long enough to participate in the Chicago exposition this year, erecting a 900-foot building for housing displays. An interesting type of continuous, welded, monitor roof beam is being used in the structure. p. 33

WASHINGTON ADVICES report that by their adroit handling of the automobile labor difficulty both the President and General Johnson appear to have revitalized their stellar roles in the New Deal drama. p. 15

UNITED STATES STEEL CORP. has just entered the thirty-fourth year of its existence. Through storm and strife of 33 years, this twentieth century industrial giant, producing over 65 per cent of the country's ingots in 1902, still turns out over 35 per cent of the total. p. 13

BULWARKED BY A RUSH to contract ahead, the operating rate for the nation's steel producing units last week held close to 49 per cent, with an increase probable this week. p. 13

AUTOMOBILE PRODUCTION currently is roughly about two-thirds for actual deliveries to buyers and one-third for dealer and plant stocks in anticipation of mounting sales in May and June. p. 18

STAINLESS STEEL is used in a conveyor belt of the continuous type, 30 feet long, for installation in a food packing plant. p. 32

ARC WELDING by alternating current, while often giving a weld of less porosity than with direct current, is confronted with the difficulties of inferior arc characterstic and higher power cost, and of obtaining as good an electrode as is available for use with direct current. p. 36

MODERN MATERIALS and up-to-date manufacturing methods are combined in the production of numerous mechanical appliances which eliminate drudgery in the home. p. 23

DUST HAZARDS arising from operation of swing-frame grinders are minimized by adoption of recently designed dust collecting equipment, attached to the grinder. p. 38

BLAST FURNACE GASES are washed, scrubbed and dried in a new multizone static washer, capable of cleaning 80,000 cubic feet of gas per minute. p. 44

Expect Price Rise as Sequel To 10 Per Cent Wage Lift

WHEN whistles blew for the first shift at iron and steel plants Monday morning, April 2, about 410,000 men, including those on the Sunday turn at blast furnaces and coke ovens, returned to work at a 10 per cent increase in their hourly wage rates.

This advance, effected at most plants following conferences with employe representation groups, rendered compliance with the President's proposal at the March 5 meeting of NRA code authorities in Washington that industry supply another filip to recovery by increasing wages and shortening hours.

Hour Schedules Hold

Nothing has developed thus far in regard to a change in the work week. From the time the steel code was made effective, last Aug. 17, to Dec. 31 the average work week was 29.2 hours, or considerably under the 32 to 36-hour goal of Washington. The limitation in the steel code is 40 hours.

Apparently the cost of this 10 per cent advance to producers will be about $3,000,000 a month. In January, the latest month for which the American Iron and Steel institute has published data, wage payments to 393,000 employes totaled $26,737,939. At present both employment and wage totals are slightly higher.

A production of 1,996,897 gross tons of steel ingots in January makes the average wage payment $13.39 per ton. It would be a sweeping but probably equitable calculation to estimate that the 10 per cent lift in wages will average $1.30 to $1.40 additional cost per ton.

Except for minor variations, the common labor rate in the iron and steel industry is now identical with the rate prevailing from August, 1923, to Oct. 1, 1931, when the first reduction necessitated by the depression was imposed. In other words, steel labor is back at the 1929 level.

Prices, however, remain considerably lower. Taking the iron and steel composite of this publication, STEEL, as an index, the average from 1923 to 1931 was $37.12, which compares with the current figure of $32.40. In other words, steel labor has regained its parity with 1929 (not taking into account any reduction in the cost of living) while iron and steel prices are off 13 per cent.

Since iron and steel has been "in the red" since shortly after the depression set in, and last year its indicated loss was $74,200,000, the assumption is that prices will be advanced to requite the higher wages.

In fact, consumers themselves began seeking the cover of contracts last week. Pittsburgh rumored the advance at about $2 per ton. If the past is any precedent, the 10-day waiting period provided by the steel code will permit coverage for the remainder of the second quarter at present levels.

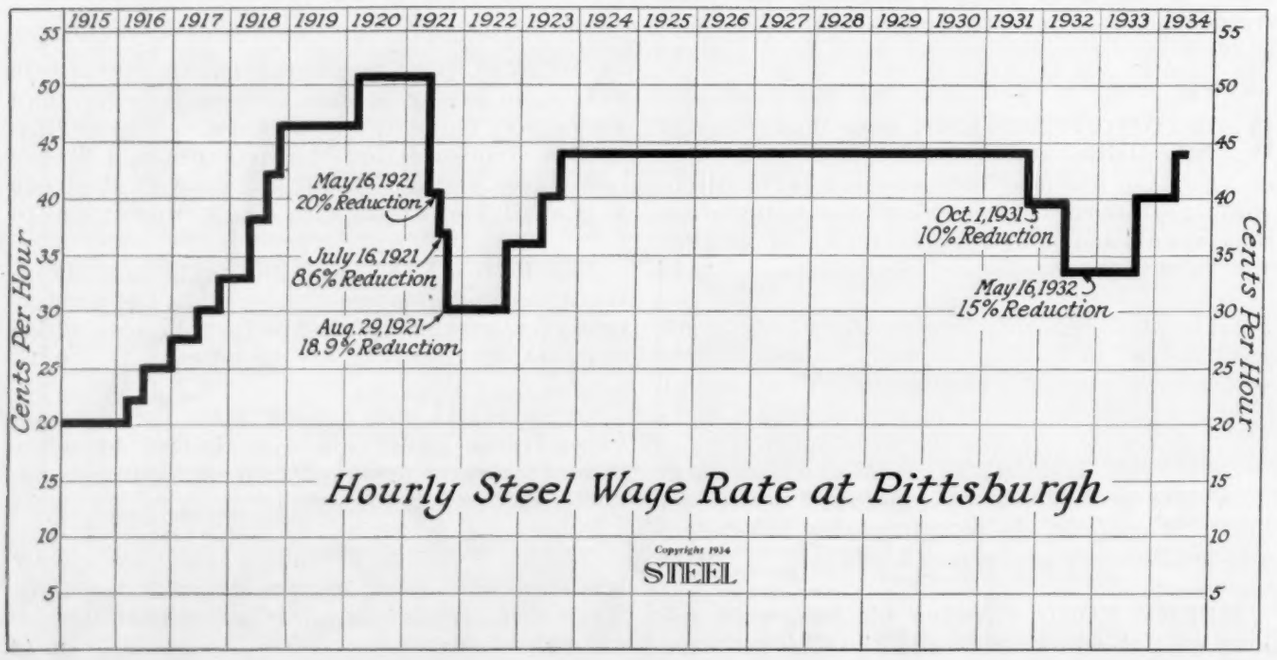
Most producers were silent last week on the extent to which office and salaried employes are affected. The official announcement of the United States Steel Corp. on Friday stated that "all lesser salaried employes will be advanced 10 per cent April 1." There was considerable speculation that those now receiving $3000 or under would participate. The National Steel Corp. was explicit that at present clerical, executive and administrative staffs would not share.

Upward Adjustments Vary

Youngstown Sheet & Tube Co. applied the 10 per cent rise to 75 per cent of its salaried force. Alan Wood Steel Co. increased its base rate from 35 cents to 41, about 17 per cent, with fixed differentials for skilled and semiskilled labor maintained.

Eastern mills not advancing April 1 are expected to do so shortly, and it is probable that salaries in the lower brackets at least will be adjusted upward.

Although a few interests had not officially announced their adherence to the 10 per cent rise, which was first divulged last Monday by the Corrigan, McKinney Steel Co., Cleveland, it was expected that every pro-



ducer would be on the new basis effective April 2.

The Steel corporation, following statements by various subsidiaries, on Friday included all manufacturing companies in the advance, which, presumably, like the Bethlehem Steel Corp., excludes shipping and mining properties.

Republic Steel Corp., National Steel Corp., Jones & Laughlin Steel Corp., Youngstown Sheet & Tube Co., Sharon Steel Hoop Co., Wheeling Steel Corp., Ludlum Steel Co., Mahoning Valley Steel Co., Gulf States Steel Co.—in fact the advance was horizontal throughout the industry even if some announcements were lacking.

Many consumers, of which the Hanlon - Gregory Galvanizing Co., Pittsburgh; Canton Stamping & Enameling Co., Canton, O., and the Mullins Mfg. Co., Salem, O., are typical, also raised their wages effective Monday. All General Electric Co. hourly workers and salaried employes receiving $2600 were advanced 10 per cent April 1.

Because the steel code set up various wages for various districts, Pittsburgh is chosen as typical for the graphic presentation of the course of wages in the chart at the bottom of page 10. During the depression, labor at Pittsburgh took a 10 per cent cut Oct. 1, 1931, to 39.5 cents per hour, and a 15 per cent reduction May 16, 1932, to 33.5 cents. The code on Aug. 17, 1933, put the rate at Pittsburgh up to 40 cents, and now it advances to 44 cents.

Washington

FOR steel, the Wagner bill held the center of the stage in Washington last week, the industry refusing to accept the patent defeat of organized labor in the automobile strike settlement as an earnest that the objectionable features of the bill would be eliminated.

However, discussion continued hot on the federal trade commission's report on the price provisions of the steel code, and the durable goods committee set up following the NRA code authority conference March 5-7 began campaigning for more stable conditions generally to assist the so-called heavy goods industries.

WAGNER BILL

Postponements have put off the steel industry's innings on this bill, originally slated to outlaw company unions and virtually turn industry over to the American Federation of Labor to organize, until Thursday.

Speakers on the schedule are Arthur H. Young, vice president, United States Steel Corp.; Charles R. Hook, president, American Rolling Mill Co.; E. T. Weir, chairman, National Steel Corp.; Frank Purnell, president, Youngstown Sheet & Tube Co.; T. M. Girdler, chairman, Republic Steel Corp.; J. M. Larkin, vice president, Bethlehem Steel Co.; Ex-Gov. Nathan L. Miller, for the Steel corporation; and Jack Larkin, representing employes of the Weirton Steel Co. Other representatives of steel labor also will speak.

WHERE MAN RIVALS NATURE: At least a half century ago in Waltham, Mass., a sapling pushed its way up through the spokes of a discarded wagon wheel, forcing the spokes apart as it increased in size. The spokes have long since rotted away, but the puddled wrought iron tire remains. The adjacent barn is fast falling into ruin, but the tire is as lasting as the tree itself—indeed, it will probably survive the tree. Photograph courtesy of the Reading Iron Co.

¶After meeting in Chicago, March 23, representatives of central western steelworks adopted a resolution protesting the Wagner (and parallel Connery) bill, declaring it to be antagonistic to the best interests of employes as well as employers, preventing amicable relations between labor and management, and substituting warfare for negotiation.

¶Speaking before the senate labor committee, conducting hearings on the Wagner bill, James A. Emery, chief counsel for the National Association of Manufacturers, last week charged that:

"This bill will stimulate complaint, promote the interruption of employment, and deliberately undertakes by its definition and operation to force employes into one form of labor organization—the union. It will secure to the union monopolistic control; assure it the unrestricted use of the strike, and thus confer the power to assess the public with the cost of sustaining a labor monopoly, maintained with federal aid, relieved of appropriate legal control, and without corresponding responsibility for the acts of its agents."

FEDERAL TRADE COMMISSION REPORT ON STEEL PRICES

A formal brief replying to the commission's report criticizing steel pricing methods under the code is expected to be filed in several weeks. Meanwhile NRA Administrator Johnson, who is as much under fire as the steel industry, has conferred with several leading steel executives.

¶Further government interest in the price situation is manifested by the appointment of a cabinet committee comprising Attorney General Cummings as chairman, and Secretary of Agriculture Wallace, Secretary of Commerce Roper and Secretary of Labor Perkins, to consider open prices under NRA codes and report to the President on his return.

¶W. A. Harriman, division admintrator of NRA, continues at work on a report on open prices, digesting evidence which he and A. D. Whiteside, former division administrator, adduced at the March 5-7 code hearing.

¶A wave of protests principally from what might be considered small consumers of steel, has engulfed the trade commission. Scores of producers and consumers have wired protests to their congressmen and the trade commission denying charges that present methods of quoting iron and steel discriminate against the small buyer.

E. L. Parker, president, Columbia Steel & Shafting Co., Pittsburgh, wired that "we are a comparatively small manufacturer and our status has been greatly improved by the protection afforded us under the steel code."

John P. Hosack, vice president, Mahoning Valley Steel Co., Niles, O., telegraphed the commission: "Feel you do not understand conditions and should leave the steel code alone." Other protests were wired by:

T. E. Kilby, president, Kilby Car & Foundry Co., Anniston, Ala.; Washburn Wire Co., Phillipsdale, R. I.; C. D. Kelly, president, LaSalle Steel Co., Chicago; A. J. Hazlett, president, Eastern Rolling Mill Co., Baltimore; West Leechburg Steel Co., Pittsburgh; Samuel G. Stafford, president, and W. A. Campbell, secretary, Vulcan Crucible Steel Co., Aliquippa, Pa.; Wyckoff Drawn Steel Co., Ambridge, Pa.; Floyd Rosen, president, Colonial Steel Co., Pittsburgh; Harry M. Reed, Anchor Drawn Steel Co., Latrobe, Pa.; Roy C. McKenna, president, Vanadium-Alloys Steel Co., Pittsburgh; Griffin Mfg. Co., Erie, Pa.; H. W. Van Benschoten, vice president and general manager, Knoxville Iron Co., Knoxville, Tenn.; Crosby Co., Buffalo; Henry D. Scott, president, Sharon

Tube Co., Sharon, Pa.; Edgewater Steel Co., Pittsburgh; F. A. Bigelow, president, Carpenter Steel Co., Reading, Pa.; A. J. Kearn, treasurer and general manager, Reeves Mfg. Co., Dover, O.; W. H. Davey, president, Canton Tin Plate Corp.; R. M. Gow Jr., Philadelphia Steel & Wire Corp., Philadelphia; A. Finkl & Sons Co., Chicago; Bliss & Laughlin Inc., Harvey, Ill.; George D. Blair Jr., Blair Strip Steel Co., New Castle, Pa.; Athenia Steel Co., Athenia, N. J.; S. P. Howe, president, Camden Forge Co., Camden, N. J.; Thompson Wire Co., Boston; Newman-Crosby Steel Corp., Pawtucket, R. I.; J. H. Porter, president, Calumet Steel Co., Chicago; Detroit Steel Corp., Detroit; Rail Joint Co., New York; Bopp Steel Corp., Dearborn, Mich.; Conners Steel Co., Birmingham, Ala.; Atlantic Wire Co., Branford, Conn.; Greer Steel Co., Dover, O.; J. E. Andrew, president, Wallace Barnes Co., Bristol, Conn.; Clayton Mark, president, Clayton Mark & Co., Chicago; Robert W. Wolcott, president, Lukens Steel Co., Coatesville, Pa.

DURABLE GOODS INDUSTRIES COMMITTEE

Under leadership of George H. Houston of the Baldwin Locomotive Works and on which iron and steel is represented by Charles R. Hook, C. R. Messinger, James W. Hook, F. A. Lorenz Jr., J. S. Tritle, and F. R. Hoadley, the durable goods industries committee last week attacked the Wagner bill, terming it a serious threat to recovery.

"At this moment more than ever stability in employment relations is the first requisite for the revival of our prostrate durable goods industries," states the committee. "Just and sympathetic relations between employer and employe are essential to recovery and progress, but they are a growth and not a manufacture."

The committee also appraises the securities exchange act as "a serious deterrent to recovery" and blames existing unemployment in industry largely on the reduced volume of private capital flowing into private enterprises. A restoration of the needed free flow of capital is a prime requisite for reviving the durable goods industries.

Meetings

NATIONAL Metal Trades association will hold its thirty-sixth annual convention at the Waldorf-Astoria hotel, New York, April 25-26. As tentatively arranged, the program will deal chiefly with the relations of government to business, especially under NRA.

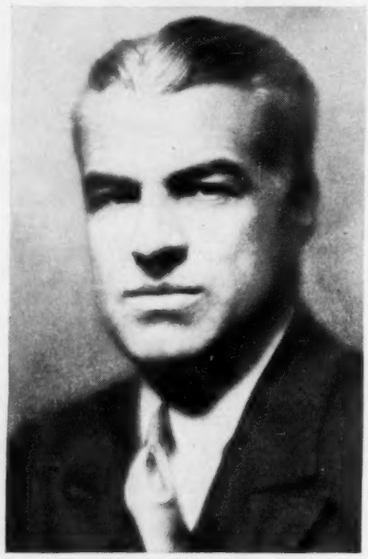
Alexander Sellers, William Sellers & Co., Philadelphia.; Charles Strawbridge, Goodman Mfg. Co., Chicago; and N. W. Pickering, Farrel-Birmingham Co. Inc., Ansonia, Conn., have been nominated for election as president, first vice president and second vice president respectively. Harold C. Smith, of the Illinois Tool Works, Chicago, has been nominated for election as treasurer.

E. B. Baltzly, Warner Gear Co., Muncie, Ind.; Jacob D. Cox Jr., Cleveland Twist Drill Co., Cleveland; Harold Falk, Falk Corp., Milwaukee; D. F. O'Brien, A. P. Smith Co., East Orange, N. J.; F. H. Payne, Metric Metal Works, Erie, Pa.; and A. H. Timmerman, Wagner Electric Co., St. Louis, have been nominated for election to the administrative council to serve for two years.

Transportation

PROPOSAL to include steel sheets among materials benefiting from the fabricated-in-transit clause in railroad freight rates was rejected at a meeting of members of the Central Freight association, held in Chicago, March 28.

¶While army engineers at Washington are holding hearings on four routes for a through canal from the Ohio river to Lake Erie, attorneys for the protesting railroads discussing the dead-end canal on the Beaver and Mahoning rivers to Struthers, O., said to army engineers at Washington last week: "If you authorize this canal, you will tie your hands to this one route."



Edward R. Stettinius Jr.

Formerly vice president of General Motors Corp., with special training in industrial relations, personnel and employe representation, who April 1 became vice chairman of the finance committee of the United States Steel Corp.

Structural Code

NEW JERSEY STRUCTURAL STEEL AND ORNAMENTAL IRON ASSOCIATION INC. has been organized under the New Jersey recovery act and is writing a state code.

Every structural steel or ornamental iron project costing more than $500 would be subject to the state code authority and bidders on steel will be required to file a description of the job, costs and bids. A minimum price would then be established by the code authority. Contractors would be free to purchase fabricated steel from any source as now but not at a figure considered below cost by the code authority.

¶NRA code for structural steel industry continues deadlocked at Washington with the labor situation of the structural industry apparently an important factor.

¶American Institute of Steel Construction Inc., New York, has mailed a progress report for the past six months to its members. The report states: "A code might have been obtained . . . had the committee been willing to make concessions to labor organizers to which it was believed the industry at large would not agree."

The institute notes progress in the publication of its new manual, stimulation of PWA and CWA work, a survey of grade crossing elimination, cooperation with the construction league of the United States in making a construction survey, and progress in advancing steel as the most desirable material in earthquake areas.

Foreign Trade

IMPORTS of iron and steel into the United States in February totaled 25,407 tons, more than the 22,653 tons in January, and 19,748 tons in February, 1933. February export statistics and further details of imports will be available next week.

NRA

PROPOSED code submitted by the American Steel Warehouse association and governing warehouses will be heard by W. A. Harriman, acting division administrator, April 5. Minimum wages range from 32½ to 40 cents an hour and $13 to $16 per week with the work-week 40 hours.

¶The following day, April 6, a hearing will be held on a supplemental code for the sheet metal distributing division of the wholesale trade.

¶Also on April 6 the manganese code will be heard. This provides minimum wages from 30 to 37 cents and a work-week of 40 hours.

¶Other NRA code hearings: Forged tools, April 3; wire, rod and tube dies, antifriction bearing and spring manufacturing, April 5; refractories, and lift trucks and portable elevators, April 9.

¶Codes approved: Metal treating, effective April 9; cutlery and manicure implements, effective April 5; supplemental codes for forged tools, ef-

fective April 3; tackle block manufacturers, effective April 5.

¶New nomenclature approved by the President eliminates possible conflicts between the code for the scrap and steel trade and the code for the wrecking and salvage industries.

Uses of Steel

RECENTLY in Middletown, O., a group composed of a steel man, a lumber dealer, an architect, a contractor, a building supply dealer, a subdivision owner, and the inventor of a new method of low-cost home construction sat together in conference and agreed upon a co-operative effort to construct a small suburban home near the American Rolling Mill Co. plant.

This joint enterprise not only offers an outlet for steel but also is claimed to eliminate the pyramiding of profit and to reduce the cost of home building substantially. The house will be a combination of steel, wood and cement, of a plan developed by R. F. Berryman. Bennett Chapple and Hugh Wright represented the Rolling Mill company.

Institute

AMERICAN Iron and Steel institute will hold its 43rd general meeting Thursday, May 24, at the Hotel Commodore, New York. As for the past several years, the fall meeting probably will be omitted this year.

¶Original prices on stainless steel Type 321 became effective March 31. These prices are 28c, Pittsburgh, bars; 34c, plates; 41c, sheets; 28½c, hot-rolled strip; 38c, cold-rolled strip; and 21c, rerolling slabs. The analysis calls for: Carbon 0.11, maximum; chrome 18 to 20 per cent; nickel 8 to 10 per cent; and titanium, four times the carbon content.

¶Effective March 30, Coatesville, Pa., the following prices were named on genuine puddled wrought iron skelp; 4c for widths 8⅛ inch and less, 4¼c for widths 8¼ to 47 inches, and 8c for widths 47 inches and over.

¶Basing discounts have been filed on butt weld steel pipe, extra strong, for structural purposes only, effective at Gary, Ind., April 5 and at Pittsburgh April 3.

¶New billet and rail steel reinforcing bars have been reduced $4 a ton at Gulf ports to 2.00c and 1.95c respectively, effective April 6.

¶The basing point on tubes, 9.74 pounds to 4 pounds inclusive regardless of size, has been changed to Shelby, O., from Pittsburgh at 10.75c, effective April 6. This price is for special SAE 4615 electric furnace steel for bearing manufacture.

¶A new listing at 2.20c, Pittsburgh, effective April 6 covers cold finished sheets, mill run, No. 10 gage.

¶Commercial resolution No. 8 amended March 15 authorizes certain reductions in delivered prices where products are delivered by other than all-rail transportation. This applies to deliveries at South Atlantic, Gulf or Pacific coast port.

Production

STEELMAKING operations held practically unchanged last week at 49 per cent, improvement in the Pittsburgh, Wheeling and eastern Pennsylvania districts neutralizing declines in the Youngstown, Cleveland and New England districts.

This week will probably show a slight gain if scheduled increases in eastern Pennsylvania and New England and at Pittsburgh materialize.

Youngstown—Down 2 points last week to 54 per cent, with the rate expected to advance to 55 per cent this week. Bookings have gained slightly the last few days.

¶National Malleable & Steel Castings Co. and Westinghouse Electric & Mfg. Co. plants at Sharon, Pa., are increasing their schedules as a

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Additional news will be found this week on pages 71 and 72.

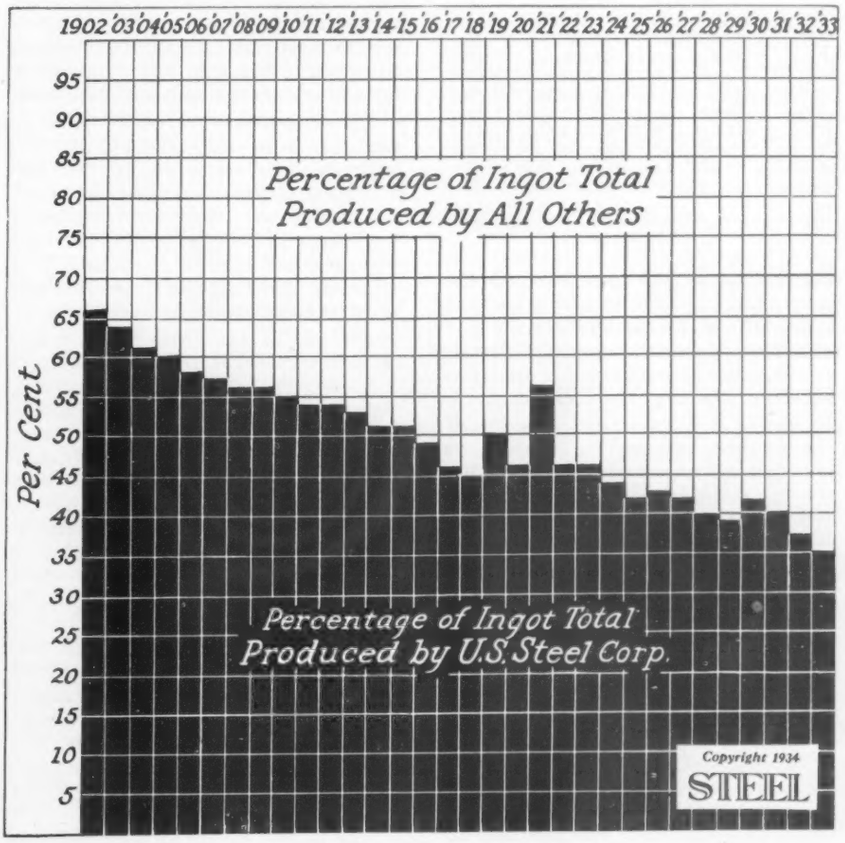
Steel Corp. Enters Thirty-fourth Year

AT ITS annual stockholders' meeting in Hoboken, N. J., Monday, April 2, the United States Steel Corp. was to mark the thirty-third anniversary of its founding. Technically, the Corporation was incorporated on Feb. 25, 1901, but it was not until April 1 of that year that it officially began doing business.

There has been some speculation whether this meeting would develop further details of the plan for decentralization first announced in general terms by Myron C. Taylor, chairman, several months ago. This plan visions the segregation of Corporation subsidiaries under one company in the more important districts, such as Pittsburgh and Chicago. Such a plan already is virtually in effect in the Birmingham district.

Monday's meeting also was expected to develop whether or not the usual annual offer of common stock to employes will be made. Having been delayed from January, the speculation has been that the offer would be omitted this year for the first time since 1915, which in turn was the first break since the offerings were initiated in 1903.

When the Corporation was organ-



ized its ingot capacity was 9,400,000 tons; today it is in excess of 27,000,000 tons. In 1902, the first year for which a report was made, the Corporation accounted for approximately 65 per cent of the total ingot production of the country; in 1934 the Corporation's proportion was 35 per cent. In 1901 the Corporation's steel finishing capacity was 7,700,000 or 50.1 per cent of the total, and its pig iron capacity was 7,400,000 tons or 43.2 per cent.

To its stockholders on Feb. 17, 1902, the Corporation reported total assets of $1,647,443,021, whereas the report for 1933 shows assets to have expanded to $2,102,896,879.

Apparently only two high officials of the original personnel of the Corporation remain—Percival Roberts Jr., today a director and member of the finance committee, who at its founding was a director and member of the original executive committee; and William J. Filbert, now chairman of the finance committee, who was assistant comptroller 33 years ago.

Those now high in the counsels of the Corporation who have grown up with it include William A. Irvin, president, who when the Corporation was formed was in the New York offices of the American Sheet Steel Co.; John Hulst, now engineering vice president; and Charles L. Wood, now vice president in charge of sales.

During all the years of the Corporation's existence its general offices have been at 71 Broadway, New York.

Stockholders were told of boom times when they first met in February, 1902. Charles M. Schwab, then president, said: "Actual business now booked and of which shipment is being called for faster than it can be supplied amounts to more than half the combined annual capacity of all subsidiary companies. Heavy products are sold up to capacity until the end of the year."

Then, when premiums were being offered for immediate delivery, the Corporation laid down the basis of its price policy, maintaining that "existing prices yield a fair return and the many collateral advantages to be gained in the long run by refusing to advance prices would be of substantial and lasting value, not only to the companies, but also to the general business interests of the country."

U. S. Steel Corp. Share Of Ingot Output Declines

Year	Ingot prod. of United States Steel Corp.	Total ingot production of U. S.	% Corp. prod. of total
1902	9,743,918	14,826,092	66
1903	9,167,960	14,422,740	64
1904	8,406,378	13,767,306	61
1905	11,995,239	19,912,751	60
1906	13,511,149	23,256,243	58
1907	13,099,548	23,217,285	57
1908	7,838,713	13,953,464	56
1909	13,355,189	23,824,715	56
1910	14,179,369	25,917,281	55
1911	12,753,320	23,546,504	54
1912	16,901,223	31,102,624	54
1913	16,656,361	31,145,637	53
1914	11,826,476	23,395,530	51
1915	16,376,492	31,966,315	51
1916	20,910,589	42,474,466	49
1917	20,285,061	44,628,853	46
1918	19,583,493	43,835,627	45
1919	17,200,373	34,220,256	50
1920	19,277,960	41,554,982	46
1921	10,966,347	19,605,740	56
1922	16,082,385	35,228,281	46
1923	20,329,950	44,383,745	46
1924	16,478,857	37,476,940	44
1925	18,898,697	44,758,450	42
1926	20,306,668	47,626,547	43
1927	18,486,444	44,260,062	42
1928	20,105,749	50,734,151	40
1929	21,868,816	55,475,397	39
1930	16,726,472	40,084,631	42
1931	10,082,398	25,533,012	40
1932	4,929,236	13,439,406	37
1933	8,046,995	22,878,571	35

How Britain Is Reorganizing Steel

WHILE the iron and steel industry of the United States is attempting to adjust itself to new conditions imposed by NRA, the British iron and steel industry is considering a voluntary plan for rationalization. On Feb. 22 the National Federation of Iron and Steel Manufacturers of Great Britain by a vote of 76 to 28 approved a plan for general reorganization, which is of great interest and will be considered again on April 19. The accompanying analysis of the British competitive situation and the reorganization plan is by Vincent Delport, European manager of STEEL.

EVENTS of considerable importance are taking place in the British iron and steel industry. At a special meeting held on Feb. 22 by members of the National Federation of Iron and Steel Manufactures, a resolution was passed by 76 votes to 28, on a scheme put before the meeting by the National Committee for the Iron and Steel Industry, this scheme embodying measures to organize the iron and steel industry of the country on a national basis.

Up to recent years, these basic industries were characterized by the individualistic attitude of the iron and steel makers, and also the finishing industries. However, following the lean years of the period 1921-23, some producers quite voluntarily took steps to modernize their works, and a process of amalgamation began.

Already at that time there was a tendency to organize the industry of the country into four geographical groups: the northeastern counties, the Midlands, Scotland, and South Wales. These changes were gradual and of an evolutionary type, and were brought about by the necessity for the British iron and steel industry to defend not only its export markets but also the home market, in which serious inroads were being made by Continental steel products.

At the end of 1931, at the time when the pound sterling went off gold, one of the principal measures taken by the National government, which had just come into power, was the establishment of an emergency tariff, and the iron and steel industries then obtained protection.

The import duties on iron and steel were not considered sufficient by the British iron and steel industry, and the government was urged to increase the tariff on foreign iron and steel to a point which would adequately stop the tide of foreign steel into the British market. In March and April, 1932, the government increased the duties on foreign iron and steel.

At that time an official body was formed, under the name of Import Duties Advisory Committee, with Sir George May as chairman. This body was set up to investigate the claims of the various British industries requesting higher import duties, and to advise the government whether such duties should be increased or not, the final decision remaining with the president of the Board of Trade.

The Advisory Committee recommended that the duties on iron and steel should be increased and remain at the new level for a minimum period of three months. At the same time, the Advisory Committee informed the representatives of the iron and steel industry that such duties could only remain in force if the industry took steps to bring about a thorough reorganization, with a view to increasing its efficiency; in other words, the industry was advised voluntarily to devise measures on its own to combat inroads of foreign competition.

At this stage the iron and steel industry set up a National Committee, under the chairmanship of Chas. Mitchell, managing director of Dorman, Long & Co. Ltd.

On June 3, 1932, the National Committee for the Iron and Steel Industry held a meeting with the Import Duties Advisory Committee and gave an undertaking to prepare a scheme of reorganization, and this assurance was renewed by the executive committee of the National Committee on Oct. 10, 1932, with the result that the government extended the duration of the duties on foreign

(*Please turn to Page* 48)

WINDOWS OF WASHINGTON

Auto Settlement Labor Loss

• • •

See Wedge in Closed Shop

• • •

Scan Steel for Weldability

WASHINGTON

OFFICIAL Washington, after having familiarized itself with the terms of President Roosevelt's settlement of the strike threat in the automobile industry, will be surprised at nothing.

It was only a month ago that the President, by executive order, set up the national labor board as an independent body with power to obtain prompt enforcements of its decisions.

Only a week ago it seemed certain that organized labor, through the labor board and the expected enactment of the Wagner bill, would soon be in control of industry.

Today, this whole situation is changed as a result of the President's settlement terms. Organized labor now finds itself on the defensive. The so-called company union has been validated. The open-shop principle has been ratified and the way opened for employing other than union men in hitherto closed shops.

The basis on which the national labor board has reached its decisions up to this time has been fundamentally changed. Senator Wagner has given assurances that his bill will be changed to accord with the President's pronouncement.

It is apparent here that nowhere did the President's definition of employer-employe relationships cause more surprise than in the administration itself. The negotiations reflect an almost complete about-face.

It has become known that three-quarters of an hour before the time for the original hearing of the automobile dispute before the labor board, on March 14, General Johnson summoned the manufacturers, together with several members of the labor board, to his office, and from then on to the conclusion of the negotiations, the matter was handled entirely by the President and by General Johnson.

IT IS readily apparent that in official circles the glamor that surrounded President Roosevelt during all but the closing weeks of his first year of administration has been fully restored.

What matters it that since then congress has passed over his veto the independent offices appropriation bill, providing increased allowance of $228,000,000 to war veterans and government employes? For the moment the President's personal star again reflects the old lustre.

And General Johnson has emerged from the automobile contretemps with a renewed reputation as the administration's strong man. To the general went the main part of the task of handling the contending parties—and it is not believed here that he took this case out of the hands of the labor board entirely on his own responsibility.

The general lived with this case, ascertained what each of the contending parties was prepared to yield, and in general softened them up for effective exposure to the bright rays of the President's personality. The feeling prevails here that the general just has acquitted himself of one of the major achievements of his career.

The President, in announcing the settlement, declared that it provided "a framework for a new structure of industrial relations." William Green, president of the American Federation of Labor, characterized the settlement as "a great step forward for the automobile workers." Alvan Macauley, chairman of the national automobile chamber of commerce, regarded the settlement as "in accord with the principles in which we believe." Everybody was satisfied.

Employers—and Washington is full of them nowadays—are uniformly pleased with the clarification of Section 7a of NIRA that was set forth in President Roosevelt's settlement terms. With them, the prestige of the administration has been elevated tremendously by this definition. Many of them have lost their feeling of concern over the Wagner bill and now are preparing to oppose this bill before the senate committee of education and labor less in a crusading spirit and more as a matter of firing the ammunition they have accumulated.

IN SOME quarters it is believed the American Federation of Labor feels less pleased under the surface with the automobile settlement than its expressions indicate.

As a matter of fact, President Green on the day following the strike settlement declared in a press announcement that "the terms of the settlement of the threatened automobile strike do not, in any way, affect the purpose of provisions of the Wagner industrial disputes bill. . . . In my opinion the terms and provisions of the settlement of the threatened automobile strike make imperatively necessary the enactment of the Wagner industrial disputes act into law at this session of congress."

While organized labor now is effectually checked in its effort to control labor throughout industry, it does benefit materially from the President's settlement. The terms of this settlement which, under the powers vested in the President by the NIRA, automatically becomes the law of the land, forces employers to recognize the American Federation of Labor as the representative of its members.

In administration circles the federation also is believed to be a distinct gainer in that it now will be able to invite men into its membership without these men incurring the wrath of their employers. It is felt here that this feature is one that will be borne in mind by employers who

will realize that dissatisfied employes will afford good recruiting material for organized labor.

Possibly the greatest loss to organized labor from the terms of the settlement is the provision that "in cases where no lists of employes claiming to be represented have been disclosed to the employer, there shall be no basis for a claim of discrimination." By this provision organized labor can represent only such men as it can prove are members.

A change for the federation is that whereas its policy in regard to layoffs is dictated by seniority, the new policy requires employers to consider individual circumstances and the degree of human suffering involved, giving preferred status to married men with families and then considering not only the matter of seniority but also the skill and efficient service of the employe.

Now as to the effect of the President's settlement terms on the Wagner bill. Senator Wagner already has agreed to three changes in this bill.

One would forbid coercion by employes as well as by employers. Another would eliminate that section of the bill that would immediately outlaw employe representation plans, commonly called company unions. A third would permit review by the courts of the facts and the law in a case that might arise from decisions by the labor board which would be created.

NRA is rearranging its staff with an emphasis on provisions for securing compliance with codes.

Thousands of complaints of code violations have accumulated and the next big effort on the part of NRA will be to give proper attention to these complaints and see to it that codes are interpreted correctly and lived up to by their industries.

It is expected that this work will come directly under W. Averill Harriman. In addition, three policy boards will be created to deal with labor trade practices and with code authorities.

NAVY department has for some time been conducting investigations to determine what changes in the chemical composition of various steels will be necessary, as well as practicable, in the interest of obtaining weldability.

With the extension of the application of arc welding to larger proportions of the structure of warships, it has become imperative to obtain steel in each of the various classes that will lend itself to welding attachment without the loss of any necessary physical characteristics forming the basis upon which the particular steel is employed, and without introducing, as a result of the welding, unacceptable local hardness, with consequent brittleness.

As is generally known to the steel trade, these investigations have pointed to the necessity of establishing limits upon carbon, manganese and silicon contents, in addition to the long-established restrictions on sulphur and phosphorus.

If these limits are set too high, the supposedly "medium steel" will practically correspond in chemical analysis to material now stocked by the navy yards as "high tensile steel" and may be expected to approach the behavior of these steels in its reaction to welding. If the limits are set too low, substantial price increases may result and competition may be unduly restricted.

As regards high tensile steel, the navy department is understood to consider manganese-vanadium steel the most satisfactory yet tested, but to be investigating other steels as specimens are made available to it for test.

As regards corrosion-resisting steel, the department has definitely concluded to specify a maximum carbon of 0.10 for both rolled products and castings, in order to keep within acceptable limits the carbide precipitation after welding and the resultant tendency to intergranular corrosion.

The present attitude of the department is one of careful investigation, based on needs of the service and the possibilities of obtaining steels of the desired compositions from the manufacturers. Navy officers concerned in the work are free in commending the helpful attitude taken generally by the steel producers and confidently expect to obtain results, with their help, that will be satisfactory both to the navy and to the trade.

Here and There In Industry

SIVYER STEEL CASTING CO., Milwaukee, founded in 1909, is observing its twenty-fifth anniversary. In commemoration of the event, an attractive booklet has been issued, depicting the progress made in the production of castings by the company during the past quarter century.

Illustrated are the crucible furnaces with which the Sivyer company started melting on Feb. 23, 1909, then the converter and the various electric furnaces employed since that time. The first Moore three-phase electric furnace ever built was installed in the Sivyer steel foundry, melting its first heat Dec. 19, 1917. It was retired 15 years later after melting 32,844 heats. The booklet similarly handles the story of the progress from hand to machine molding as well as cleaning, heat treating and laboratory methods.

Six of the men who were employed by the company in 1909 still are active. These include three members of the executive staff—V. R. Messinger, chairman of the board; William C. Frye, a director; and L. S. Peregoy, president—in addition to three shop men.

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Calumet Steel Co. will remove its offices April 14 to 20 North Wacker drive, Chicago.

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Holly-Stover Inc., Washington, has opened a sales office in the Straus building, Chicago, for the sale of beehive foundry coke, produced by the Fire Creek Coal & Coke Co., and of New River smokeless coal.

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Seneca Falls Machine Co., Seneca Falls, N. Y., has appointed W. H. Nettle, 236 Richton avenue, Detroit, its direct representative for Detroit, including all of Michigan, instead of the Cadillac Machinery Co. Detroit.

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Macwhyte Co., Kenosha, Wis., manufacturer of wire rope, has appointed Horace T. Potts & Co., Philadelphia, its distributor in the Philadelphia district. John W. Taylor, resident sales engineer for the Macwhyte Co., will be associated with the Potts organization.

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Meehanite Metal Corp., Pittsburgh, has issued the following licenses for production of castings under its processes: Kanawha Mfg. Co., Charleston, W. Va.; Ashmore, Bensen, Pease & Co. Ltd., Stockton-on-Tees England; Ealing Foundry Ltd., London, Eng.; Cameron & Robertson Ltd., Kirkintilloch, Scotland; Hille Werke, A. G., Soest A. G. Foundry, Germany; Fonderie Milanese de Acciaie, Milan, Italy; and Societe de Produits Metallurgiques, Paris, France.

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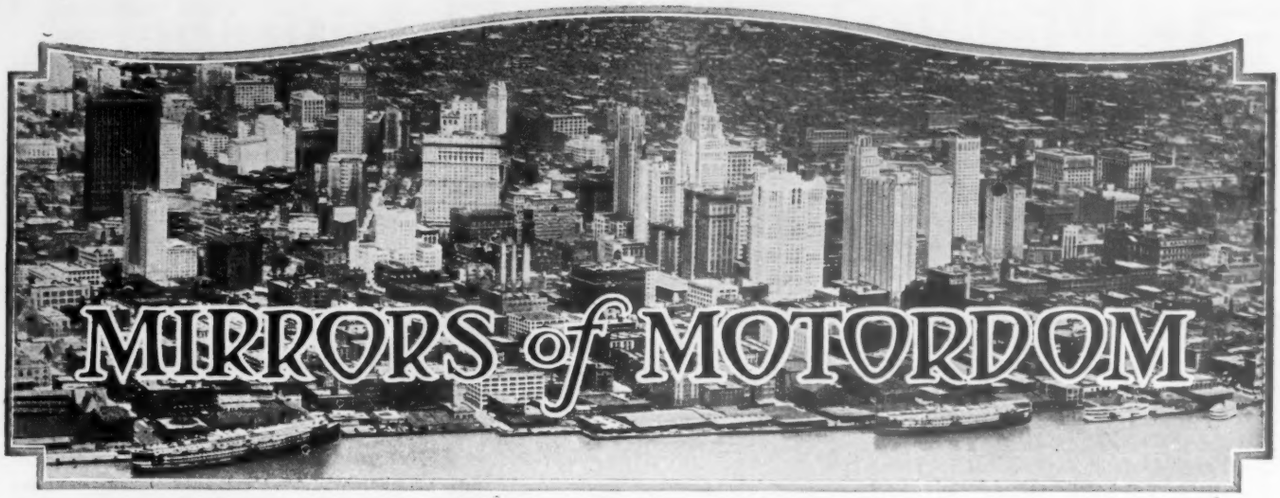
Walsh Refractories Corp., St. Louis, has bought the plant and clay properties of the North Missouri Refractories Co., formerly Missouri Fire Brick Co., at Vandalia, Mo. The acquired plant will be operated in conjunction with the St. Louis plant of the buyer. The latter will be devoted to production of glass house refractories from Cheltenham clays, found only in St. Louis, high temperature cements and other specialties. Officers of the Walsh company include the following: President, N. S. Chouteau Walsh; vice president, C. J. Gundlach; treasurer, R. D. Humphreys; general manager, J. L. Crawford; superintendent, Fred H. Schwetye; sales manager, J. H. Fisse; assistant sales manager, H. Oswald.



Weak Spot in Strike Pact

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Building Up Dealer Stocks

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Steel Contracts Now Sought

DETROIT

DETROIT would feel much better over last week's settlement of the threatened automobile strike if it could gage the long-range implications of the industry's willingness to submit all labor disputes to the newly-created mediation board.

Unquestionably the industry scored heavily in the negotiations at Washington. In obtaining what amounts to government recognition of the open shop it not only disarmed the American Federation of Labor of its principal weapon but it also may have written a new magna charta for industrial relations.

No longer can organizers go to automobile labor and argue that the government—in fact, the President—desires it to enroll in a union, and that otherwise labor cannot benefit from the recovery act. The value of eliminating this form of coercion cannot be over-estimated.

Also, the industry averted a costly shutdown at its busiest season; it maintained its position that it would not treat with or recognize unions as such; it won its contention that unions claiming to speak for employes must divulge their membership rolls—in this case to the board on which the industry is represented.

But there are many in Detroit who question whether the industry needed to have gone the length of conceding the creation of this board to adjust all labor disputes, without appeal. In other words, after raising wages and reducing hours, to surrender the last word on its labor relations to Dr. Leo Wolman, neutral member of the board, who has a labor background.

Only these on the inside of the negotiations at Washington know how much heat the President and General Johnson turned on. It may be that the time has arrived when the automobile industry, like others, must bend before the storm and submit to government by compromise and arbitration. Perhaps tempering principle with expediency is required.

Nevertheless, there is a strong undercurrent that without being stiff-necked the automobile industry was in an impregnable position, and that important as are the concessions that it won, it yielded one point too much.

It is only recording fact to note considerable disappointment and apprehension in Detroit, and an important automotive president sums up this viewpoint when he says the settlement has set the industry back 20 years.

CERTAINLY the immediate outcome is trench warfare, and all sides are settling down to a war of attrition.

Generally speaking, employes now have four options, which means that all four will campaign for their favor: (1) works councils, equivalent to what steel knows as employe representation plans; (2) American Federation of Labor vertical or federal unions; (3) Mechanics' Educational Society, principally tool and die makers, which precipitated last fall's strike, and (4) the Automobile Workers' union, a communist organization.

Incidentally, under the President's pronouncement the phrase "works council" probably will have a broader meaning and apply to a grouping of all four. In other words, each works is to have a council in which representation will be accorded to all four on a proportion basis.

The unions, of course, can no longer insist that the only "out" for employes is to join them, but they will press for members and presumably will tolerate the present settlement only until they are able to upset it.

No less than President Green of the American Federation of Labor states: "It is inconceivable that the company union may exist alongside an A. F. of L. union in the same plant or in the same industry."

This starkly stamps the President's agreement as a truce and not a final settlement, and prompts the pessimistic view that the industry continues to sit on top a volcano.

One thing is certain: Automobile labor wants to work, and the unions not only threaten to bring strikes and idleness but also cost money. On the other hand, there is an offset in that during the summer production may ease off seasonably, layoffs become necessary and the occasion for pinpricks will arise.

It is noteworthy that organized labor—which one supply interest observes should rightly be termed labor organizers—has been bearing down hard on General Motors. The specific complaints which precipitated the discussions at Washington were lodged against Buick and Fisher Body at Flint and against Hudson. Union tactics may be to try to bag this interest first, confident that the rest could then be corralled easily.

While Nicholas Kelley, legal adviser to the national automobile chamber of commerce; Richard L. Byrd, secretary of the Pontiac locals of the American Federation of Labor, and Dr. Wolman may constitute the supreme court for labor for the chamber of commerce group, their jurisdiction ends at the front gate of the Ford Motor Co.

It is inconceivable that Henry Ford, who has remained outside of NRA and has always played the lone wolf, would surrender any freedom of action to this board, and Detroit believes what is rumored at Fordson—that the plant would be shut down tight before Mr. Ford would bow to the board.

THE effect of the settlement on labor and plant management is one thing; that on retail markets another.

During all the threats and nego-

tiations, production of automobiles scarcely wavered, and there has been no dilution of the underlying confidence that, with labor generally smoothed down—and this settlement should help do this—retail demand will bulge.

Since the great majority of automobile sales are on time and are accounted for by what may be denominated as labor, what is needed to unlock the first down payment is some assurance of stability of employment. Detroit believes this assurance is contained in the strike settlement. It looks for May and June sales to be the best since 1929.

Just about the time the automobile strike was threatened, the industry was catching up on orders booked at or shortly after the January shows and delayed in filling because of mechanical handicaps in swinging over to independent springing and other mechanical changes. The past week or ten days may be said to be the first period this year when production actually exceeded current retail demand—with the possible exception of Chrysler.

Current production, therefore, is roughly about two-thirds for actual deliveries to buyers and one-third for dealer and plant stocks in anticipation of May and June retail selling. This is a seasonal development, but it is probable that stocks will be built up to a higher point than in any previous spring of the depression.

Passenger car and truck assemblies in January totaled 161,086 units. In February they expanded to 235,376, and in March undoubtedly to more than 300,000. Although April has one less working day than March, on a 5-day week basis, indications this early are for a slight increase. May and June, of course, will be sensitive to current retail demand, but any decline would not be unseasonal.

AT THE end of the first quarter the contenders for 1934 apparently are hitting their stride, and the order is Chevrolet, Ford, Plymouth.

Chevrolet, which has made production history after getting away to a bad start, has been holding closely to 5000 units a day and turned in approximately 100,000 units for March. There are no indications of assemblies getting much above the 5000-mark right away, nor is there any sign of weakening. For the present, this maker can be appraised in the 5000 class.

Ford continues to be steady at about 4000 units a day, also 5 days a week, finding that this total meets requirements of dealers for retail deliveries and also for stocking for the spring trade. The tentative schedule at Fordson is predicated on a 4000 daily rate for some time.

Plymouth last week reached the

Obituary notices will be found this week on page 72.

place where it too can make practically prompt deliveries, although there may be a little difficulty getting the right color on the wanted model. Its daily rate is slightly above 1500 units.

So, for the time being, the lineup of the big three is Chevrolet, 5000; Ford, 4000; and Plymouth, 1500.

Hudson-Terraplane, which on March 17 reported sales equal to one-half of all 1933, is assembling close to 1000 units daily, or at the rate of 18,000 monthly, the ratio being about 60 per cent Hudsons and 40 per cent Terraplanes.

Pontiac, whose February production was 10,840 units and which entered March with retail orders for 24,833, about lived up to its March schedule for 18,000 cars.

Dodge is rather steady at 800 units daily, 5 days a week, while 350 of the new DeSoto and Chrysler airflow models are rolling off the lines each day. Deliveries of these models continue somewhat deferred.

Retail sales of automobiles are relatively better in the West and South than in the North and East. For one thing, the season naturally is advanced in the South, while the West has enjoyed a comparatively mild winter.

As reported by Chester G. Abbott, general sales manager of Hudson, following a swing through these parts of the country, the Pacific Northwest lumber business is running far ahead of last year, while the return of liquor is stimulating California.

In these regions prospective buyers are less hesitant now to assume obligations, and this attitude is expected to be manifested in the East when spring weather really comes.

Partly in anticipation of a good spring, partly because of a fresh slant on prices, automotive buyers are more anxious to cover ahead for steel than they were two weeks ago.

The 10 per cent rise in steel wages is regarded as a factor for higher prices eventually, and both General Motors and Chrysler in the past week have made commitments indicating their belief that steel will go higher before it goes lower.

However, so far as second quarter costs of manufacturing automobiles are concerned, iron and steel will supply no lift. During the 10-day waiting period prior to an advance buyers would be enabled to cover until June 30. Inventories of steel today are believed to be little more than half what they were Jan. 1.

Little new pig iron has been melted thus far in 1934 for engine blocks. General Motors has on its dock at Saginaw enough iron from Corrigan-McKinney to carry it well into the summer; Ford has been picking up foundry iron off the stockpile; Chrysler has been taking in some new pig but has been using its reserves.

Chevrolet will announce its economy series April 14. . . . Hupp is reopening its Cleveland body plant, making bodies for its new low-price job. . . . Chrysler has leased some press equipment in the Packard plant. . . . Chrysler is using about 2,000,000 pounds of steel daily for stampings at its Dodge plant.

Predicts Fewer Engineers, And Those Specialists

ANALYZING the outlook for employment of technical graduates, E. B. Roberts, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., concludes:

1. *We have passed in our national history from a period of exploitation, speculation and development into a level period of operation in which fewer engineers will be needed.*

2. *Superior ability and training will be demanded for success, especially on the part of the relatively smaller group that will continue to push engineering research and design in yet unexplored fields.*

3. *Quick adaptability to productive work will be rewarded.*

4. *Under the new conditions postgraduate training will flourish, chiefly in industry and as part of the job but with the co-operation of the schools.*

5. *Engineering teachers must recognize new fields for graduates.*

Form Troy Furnace Corp. To Operate Troy Stack May 1

Troy Furnace Corp. has been organized under Delaware laws and will place in operation May 1 the blast furnace at Troy, N. Y., of the Hudson Valley Fuel Corp., subsidiary of the Niagara-Hudson Corp. The furnace operated at capacity requires 150 workmen.

Incorporators are S. O. Hobart, of Troy; John A. Hill, of Jackson Heights, L. I.; Philip D. Ferral, of Brooklyn, N. Y.; and William H. Jeffers, of Forest Hills, L. I. Mr. Hobart, an experienced operator, will direct the plant. E. L. Shober is vice president, and John Yoder secretary-treasurer.

Iron ore will be obtained from the mines of the Witherbee-Sherman Co., Port Henry, N. Y., it is said. The pig iron produced will be marketed to foundries and steel mills in the East through Hickman, Williams & Co. The furnace has a capacity of 10,000 to 12,000 tons a month.

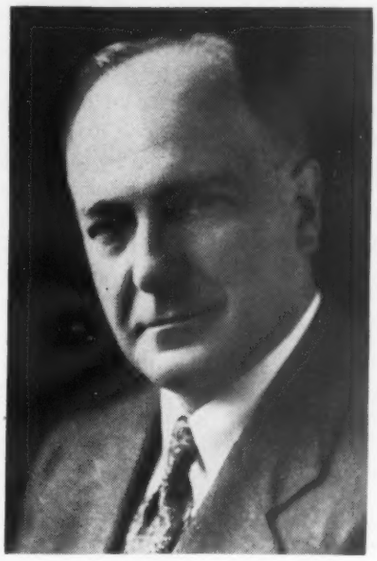
Industrial Men in the Day's News

Arthur H. Young, Vice President in Charge of Industrial Relations, United States Steel Corp.

Starting work in steel mill production departments, he later became interested in safety promotion.

As an outgrowth of early training he became an adviser on industrial relations problems, his present field.

For the past ten years he has been active in accident prevention work in government yards and arsenals.



ARTHUR H. YOUNG, newly-appointed (STEEL, Feb. 5, p. 21) vice president of the United States Steel Corp., in charge of industrial relations, is one of the country's best known men in that field. He is thoroughly trained in the particular problems of the steel industry and at present is leading the industry's protests against the Wagner labor bill at Washington.

Born in Joliet, Ill., Dec. 19, 1882, he went to work at the age of 14 in the Joliet works of Illinois Steel Co., as a messenger boy and then leverman. In 1902 and 1903 he worked at the Pueblo works of Colorado Fuel & Iron Co. as rigger and roll hand. His next move was to the South works of Illinois Steel Co., where he served successively as timekeeper, payroll clerk, assistant supervisor of labor, chief safety inspector and supervisor of labor and safety.

He was elected a director of the American Museum of Safety early in 1917 and in July, 1918, became manager of industrial relations for International Harvester Co., Chicago. From July, 1924, to Feb. 1, 1934, he was in charge of Industrial Relations Counsellors Inc., New York, a non-profit organization underwritten by John D. Rockefeller Jr. for doing research and advisory work in industrial relations. During most of that period he was loaned to the United States government, serving as chief safety expert, in charge of accident prevention in all arsenals, navy yards and other government establishments.

Mr. Young served as president of the National Safety council in 1920. He is vice president of the American Management association and of the American Museum of Safety. He served as special representative, United States department of labor, assisting in the organization of the national re-employment service.

He is advisory counsel of the International Labor organization which has headquarters in Geneva, Switzerland, and is a subsidiary of the League of Nations. His present headquarters are in the Steel corporation offices at 71 Broadway, New York.

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W. P. Ewing has been appointed general sales manager of Superior Steel Corp. Pittsburgh. Previously he was assistant general manager of sales and has been with the Superior corporation continuously for the past 17 years.

F. R. Frost, president, J. E. Wetzel, vice president, and C. D. Claney, secretary and treasurer, have been re-elected.

N. K. Schaller has been elected comptroller and assistant treasurer, and D. W. Liddell assistant secretary.

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W. Scott Milne has been named production manager of the Chicago plant of the Ingersoll Steel & Disc Co., a division of the Borg-Warner Corp., Chicago. He recently was factory manager of the Batavia, N. Y., works of the Massey-Harris Co., and has had many years of experience in the fabrication of iron and steel products. During the war he supervised the production of munitions and following the war he was general superintendent of the Fairbanks-Morse & Co.'s plant in Quebec. Later he became superintendent of the Toronto plant of the Massey-Harris Co.

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Thomas B. Moltrup recently was appointed assistant treasurer of the Moltrup Steel Products Co., Beaver Falls, Pa.

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Lyle W. Bowers has been appointed Cleveland district manager of the Alvey Conveyor Mfg. Co., St. Louis, with offices at 2184 Northland avenue, Lakewood, O.

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J. L. Neudoerfer has been elected a director of the Wheeling Steel Corp., Wheeling, W. Va., succeeding the late W. H. Abbott. Retiring officers and other directors have been reappointed.

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C. C. Rosser, formerly district sales manager at Cleveland for the Detroit Seamless Steel Tubes Co., Detroit, has been transferred to Detroit as district sales manager, succeeding the late Roy Berryman.

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Joseph Dilworth, prominent Pittsburgh industrialist, has been chosen deputy administrator in charge of NRA codes for the machinery and equipment division. He is now on leave of absence from Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

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Henry A. Roemer has been reelected president of the Sharon Steel Hoop Co., Sharon, Pa. L. F. Rains, president of the A. M. Byers Co., Pittsburgh, has been named to the board of directors of the Sharon company, succeeding J. Reid Evans, secretary-treasurer of the latter company.

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Maxfield Pease has been appointed northern Ohio sales representative for H. O. Swoboda Inc., consulting electrical and mechanical engineer, Pittsburgh, with offices at 4614 Prospect avenue, Cleveland. Succeeding the late E. H. Herrick, Mr. Pease will handle sales of Falcon continuous electric heat treating furnaces, bare electric immersion heaters and other electric heating equipment.

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Dr. J. T. Robson has been placed in charge of all laboratory and research activities of the Ferro Enamel Corp., Cleveland. He was formerly with the Allied Engineering Co., Columbus, O., recently taken over as a branch of the Ferro company, handling pottery-kiln and glaze lines. A former instructor in ceramic engineering at Ohio State univer-

(*Please turn to Page* 73)

EDITORIAL

Don't Cheer Yet; the Labor Problem Is Not Solved!

IN THE light of the Roosevelt administration's 13-month record in handling labor problems, employers, employes and the public will do well to restrain their enthusiasm for the President's action in the Detroit crisis until the real outcome is more clearly defined.

No one will belittle the President's feat in averting a dangerous strike. On many occasions he has shown remarkable ability in composing differences between opposing factions. But in this instance, as in the others, the settlement may prove to be simply a temporary expedient—an evasion or postponement of the real issue, rather than a lasting or satisfactory solution.

Consider the principles upon which the "settlement" was based:

> 1. "Employers agree to bargain collectively with the freely chosen representatives of groups and not to discriminate in any way against any employe on the ground of his union labor affiliations.
> 2. "If there be more than one group each bargaining committee shall have total membership pro rata to the number of men each member represents.
> 3. "NRA to set up . . . a board . . . to pass on all questions of representation, discharge and discrimination. . . .
> 4. "The government makes it clear that it favors no particular union or particular form of employe organization or representation. The government's only duty is to secure absolute and uninfluenced freedom of choice without coercion, restraint or intimidation *from any source.*"
> 5. (States a plan of priority for reducing or increasing the number of workers in a plant.)

Settlement Is Only Belated Attempt of Government To Correct Its Own Mistakes

The first principle is a restatement of Section 7a of NRA.

The second, providing for proportional representation, is a new venture for NRA. It has broad implications, the benefits or handicaps of which will depend entirely upon the manner in which the 24 words are interpreted.

The third principle, involving an arbitration board of three, is an old device which has about a fifty-fifty chance for success.

The fourth paragraph is a statement of intent—a statement made necessary only by the fact that the administration for nine months has refrained from clarifying its position. The only point of new significance is found in the last three words, "from any source." In these, President Roosevelt concedes officially for the first time that there may be "coercion, restraint or intimidation" from any other source than employers.

Looking at the settlement broadly, it appears to have promise of workability, but only in the degree to which the administration adheres to this latest declaration of its intent to be fair. New dealers have reiterated this intent dozens of times previously and yet they continued to favor national labor unions at the expense of representation plans. In other words, the President's "new basis of understanding between employers and employes" can be no more effective than the administration's sincerity in practicing what it preaches.

Wagner Bill So Bad Modification Cannot Save It; Must Be Killed or Rewritten

Unquestionably the settlement of the threatened automobile strike will affect the status of the Budd and Weirton cases and will necessitate changes in the Wagner bill. But there is nothing in the situation to justify any change in industry's efforts to see all three of these situations through to an equitable conclusion. In fact, the new complications should spur employers to greater activity.

Remember that even though Senator Wagner may agree to altering his bill to safeguard the interests of employe representation plans, it still would be the most destructive proposal ever considered in congress.

It would still place every employer of "one or more employes" under the domination of a "national labor board," whose powers would include the right to investigate on hearsay evidence, to demand confidential records, and to compel obedience to its will in a degree not permitted any other government agency.

Rather than helping to minimize labor disputes it would tend to magnify them. Instead of advancing the status of American employes, it would impose upon them a condition of slavery to national labor union overlords. Far from encouraging intelligent administration of national labor unions, it would promote racketeering. It would incite class hatreds and destroy the fruits of half a century of progress in labor relationships.

The Wagner bill is too unjust in intent and in letter to be susceptible of acceptable modification. It must be defeated in toto or completely rewritten from an entirely different approach to the labor problem.

Industry should not rest on its oars until this destructive measure is killed.

THE BUSINESS TREND

Sentiment Is Mixed As To Second Quarter Outlook

INDUSTRIAL activity in the first quarter of 1934, as measured by the average index of industrial production compiled by the federal reserve board, stood at 81 as compared with 63 in the first quarter last year. The increase is about 28 per cent. Moreover, the trends in the three-month periods were almost direct opposites. In the first quarter of 1933, the index dropped three points, or slightly less, each month. In the same period of 1934, the index advanced three points each month.

But, as we enter the second quarter, a different situation is confronted. Last year the index of industrial production jumped six points in April, 12 in May, and 14 in June. Thus the record of the present quarter will be matched against that spectacular rise. How will it measure up?

To answer positively is impossible. Today sentiment is mixed. A strong current of optimism is present in almost every branch of industry, yet it is impeded by doubt as to what the future course of government policy will be. In fact, right now the barometers of current business show relapses in steelworks operations, automobile production, car loadings, electric power output, etc. In each case the setback seems to be of temporary character—perhaps an outgrowth of labor troubles. This mild recession late in March has made the curve of business conform in shape to the curve of the first quarter of 1931, when the peak was reached about March 21.

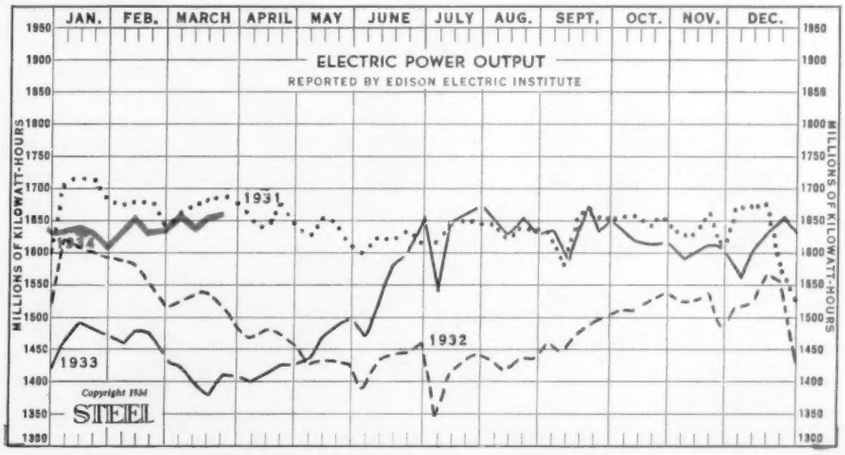
Repudiation of Leadership by Congress Changes Aspect of Long Term Business Outlook

The long term prospect is complicated by the recent demonstrations of rebellion in congress. The government is engaged in so many activities touching upon the welfare of industry that a complete repudiation of the present leadership by the house and senate would create many difficulties. The monetary plan, for instance, could develop into a dangerous menace in the hands of an uncontrollable congress.

Proper action by the administration still can restore confidence, but it must be forthcoming promptly if it is to be effective.

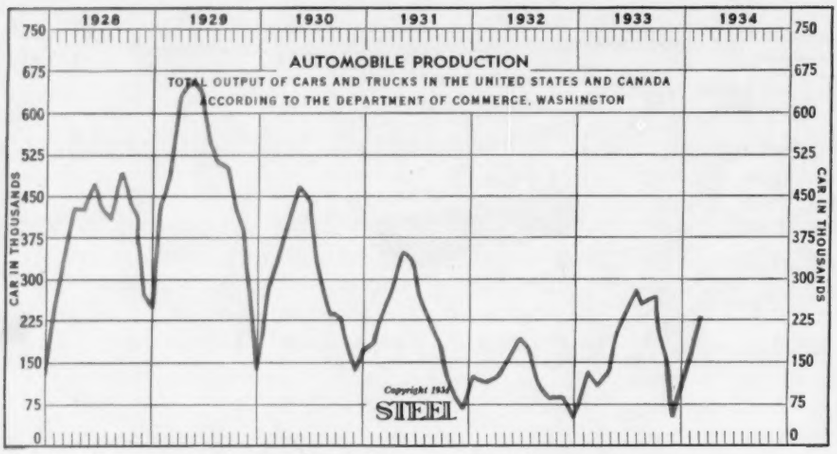
1934
Million Kw.—Hr.

March 24 ..1,658
March 17 ..1,650
March 10 ..1,647
March 3 ..1,658
Feb. 24 1,646
Feb. 17 1,640



1933
Million Kw.—Hr.

March 25 ..1,409
March 18 ..1,375
March 11 ..1,390
March 4 ..1,422
Feb. 25 1,425
Feb. 18 1,469



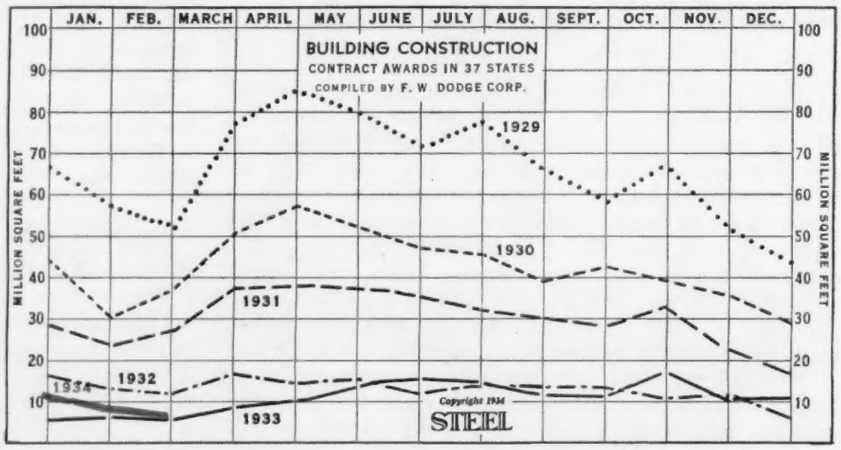
February, 1934	243,947
January, 1934	167,990
February, 1933	110,186

Automobile Production Up Sharply in February

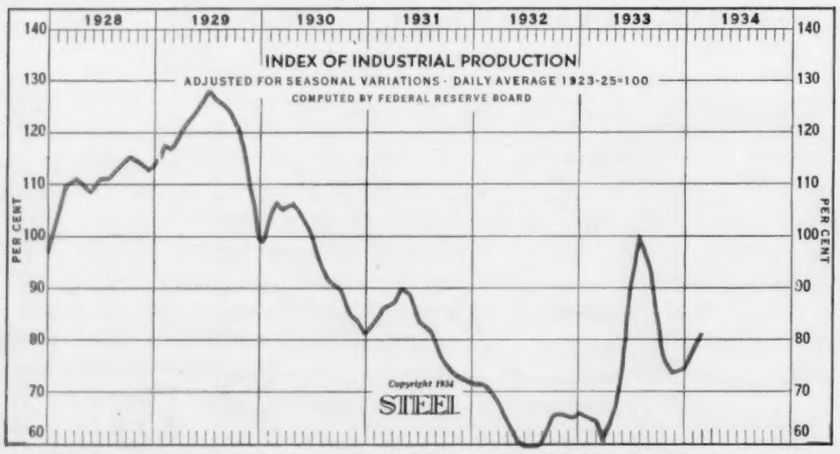
Production of passenger cars and commercial motor vehicles in the United States and Canada during February advanced 75,957 units. According to the report from the department of commerce, the February output totaled 243,947 units, compared with 167,990 in January and 110,186 produced in February, 1933. Output in the first two months of this year totaled 411,937 units of which 15,475 were produced in Canada.

Building Trend Shows Little Improvement Over Last Year

Building awards as measured in new floor space in 37 eastern states declined nearly a million and a half square feet in February. According to the latest report of the F. W. Dodge Corp., total construction for the second month involved 8,176,300 square feet as compared with 9,568,700 in January. When compared with the 7,382,400 square feet of new floor space awarded in February, 1933, the building industry thus far has shown only faint improvement over a year ago.



	Square Feet
February, 1934	8,176,300
January, 1934	9,568,700
February, 1933	7,382,400



	Per Cent
February, 1934	81
January, 1934	78
February, 1933	63

Industrial Production Index Advances in February

Industrial production, as reported by the Federal Reserve board, advanced 3 points in February. The monthly production index, adjusted for seasonal variation, was 81. This compares with 78 in January and with 63 in February a year ago. In the manufacturing group, the iron and steel production index advanced 8 points to 64 and compares with 31 in February, 1933. Increases also were reported for textiles and automobiles, the latter advancing 15 points to 73.

MANUFACTURING APPLIANCES FOR HOUSEHOLD USE

BY J. B. NEALEY

DEVELOPMENT of modern mechanical household appliances has gone a long way toward elimination of drudgery in the home, at the same time supplying new outlets for steel and iron in various forms. In the creation and engineering of new devices, not only new materials are called for, but also methods and equipment for economical manufacture.

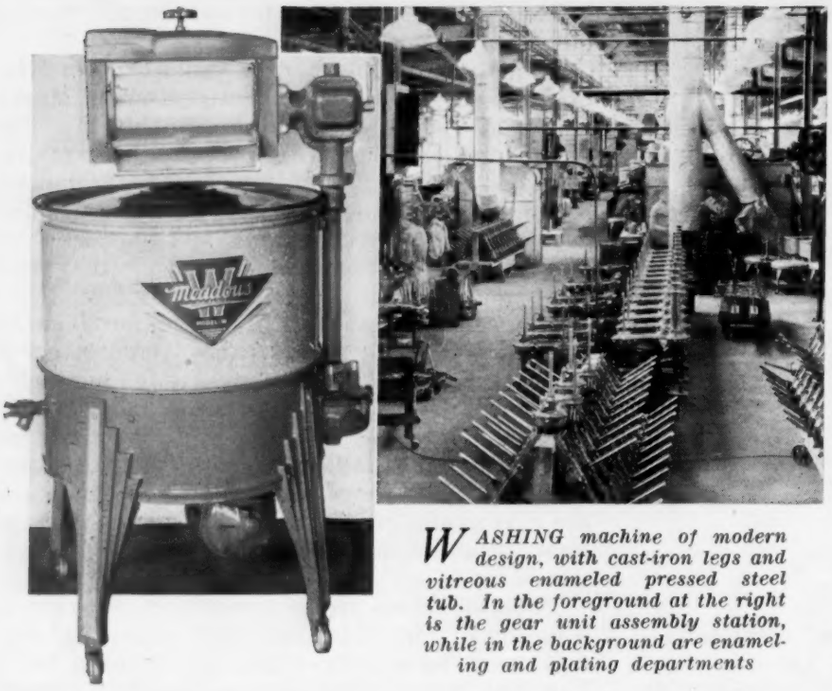
Pioneering in this field is the Meadows Mfg. Co., Bloomington, Ill., recently (STEEL, March 26, p. 15) taken over by the Hurley Machine Co., Chicago. The Meadows company manufactures a long list of household appliances, best known of which probably are electric and gasoline washing machines and power press irons, the latter equipped to use either fuel gas or electricity.

The washing machine, illustrated on page 24, comprises a rigid steel frame, bonderized to protect against corrosion; a vitreous enameled tub of pressed steel; aluminum impeller; wringer; motion and power unit including ground and polished worm and gear, and eccentric drive to sector gear; cast iron legs; and die cast drain. All gears are machine cut and heat treated, being enclosed in an oil-tight gear case.

Portable press irons are almost entirely of aluminum for lightness, and comprise cast aluminum base, hinged arm and ironing board and shoe, with a total weight of only 30 pounds. Larger models are of cast iron—with the shoe polished and chrome plated. The gas-fired irons are provided with a series of small gas burners, completely enclosed within the unit, a thermostatic control and a collapsible steel table. Nuts, screws and bolts all are cadmium plated.

The plant is fully equipped to manufacture the various parts entering into the construction of these devices. Among the various divisions are found-

TWO views of assembly departments for washing machine units. Above is the division where wringers are assembled and mounted on the machines. Side of the baking oven is visible at the extreme left. To the right is the final assembly floor where motors are installed, casters attached and the units inspected before shipment



WASHING machine of modern design, with cast-iron legs and vitreous enameled pressed steel tub. In the foreground at the right is the gear unit assembly station, while in the background are enameling and plating departments

ry, core room, pattern shop, machine shop, tool and die shop, pressed steel department, assembly, testing, plating and finishing, and shipping.

The foundry is provided with a cupola, gas-fired annealing furnace and other more or less standard equipment. Pattern shop is equipped to turn out both wood and metal patterns. Large storage space for patterns is provided, many being for replacement parts on machines still in use after 30-odd years of service. Two parts for the irons, cast in the foundry, are the buck and shoe, the latter containing the gas burners and being of complicated design with many baffles on the inside surface to absorb and distribute the heat. Covers for these parts are stamped of sheet steel.

Complete Machining Facilities

Numerous parts for the washing machine such as gears, worms, shafts and the like, are cut in the machine shop which is completely equipped for a wide range of metalworking operations. Heat treating is done in either box-type furnaces or cyanide baths, all fired with gas. Metal cleaning is accomplished in a box-type washer with a chain conveyor traveling through it. Washing solution from an included tank is sprayed on the parts through special nozzles. Heat is supplied by gas burners.

In the plating division copper, zinc, cadmium, nickel, chromium and other metal finishes are applied. Tanks are heated by immersion heaters, comprising a looped steel tube in the bottom of the tank, one end rising out of the tank for venting exhaust gases, while the other end is welded into the side of the tank, thus affording an opening to the outside. Heat is furnished by a gas burner which fires directly into the tube.

Other finishes, such as paint, lacquer and the like, are applied in the assembly division which includes long rows of assembly lines for different products, similar to assembly lines in automobile plants. For instance, there are three lines on which washing machines are assembled. Adjacent to and synchronized with these lines is a gas-fired baking oven with spray booths just outside. As soon as the gearbox assembly of the washing machine has been put together this portion of the unit is rolled on a dolly to a booth where it is sprayed, and then it is transferred to the oven.

The oven is of sheet steel, insulated, 70 feet long, 10 feet wide and 7 feet high. It is provided with four tracks of angle iron to guide casters of the dollies, thus permitting two lines of assemblies to pass through at the same time. The dollies are moved through by means of an endless chain and dogs.

Heat is supplied by eight drilled-pipe gas burners extending across the oven near the floor level. Tracks are raised 18 inches to provide for maximum heat circulation. Thermostatic control maintains close temperature regulation.

For intermittent runs of small parts, batch-type ovens are used. Of similar construction to the large oven, they are 4 feet long by 5 feet wide and 7 feet high, each being heated by two gas burners.

Following the various finishing treatments, the machines are assembled as they move along the line, motors installed and tested, the entire unit carefully inspected and packed for shipment.

Complete Line of Metal Specialties Featured

Production of small metal specialties such as signs, name plates, emblems, labels, escutcheon plates, medallions, dials and a wide range of novelties, on which some form of printing, embossing or coloring is required, involves a specialized technique. A leader in this field is the L. F. Grammes & Sons Inc., Allentown, Pa., a plant which has been devoted to the manufacture of these specialties since 1875.

Recently the company has prepared two folders, one describing name plates, the other miscellaneous metal products, copies of which are available by addressing the company. With the advent of modern packaging and display methods, considerable ingenuity has been shown in the metal printcraft, a trend revealed strikingly by these two descriptive folders. Products of the company are made by a variety of methods, including etching, printing, lithographing, embossing, stamping, engraving, casting and the like. A wide scope of finishing treatments and color combinations is available.

An endless variety of wire formed products, such as paper clips, hangers, hooks, staples, rings, bottle openers and links also is included in the company's manufactures.

New Copper Alloy Conduit Corrosion Resistant

To provide an electrical conduit which will not rust and deteriorate under highly corrosive and moist conditions and thereby become a fire hazard, the American Brass Co., 25 Broadway, New York, has developed such a new conduit made from its copper alloy Everdur. It is sold under the name "Everdur Electrical Conduit."

This alloy is immune to rust and is highly resistant to a wide variety of corroding agents. It has strength comparable to mild steel; is tough, ductile, and resistant to shock and stress; and will not corrosion crack under stress.

The new conduit has successfully passed all required tests for short circuit and ground, resistance to arcing, electrical bonding and fittings, tensile and compressive strength, resistance to impact and bending qualities. These safety features suit it for locations where ordinary conduit has a short life, or where sparks from short circuits and arcs present a dangerous hazard.

It is furnished in standard 10-foot lengths in seven sizes ranging from ⅜ to 2-inch nominal size and with wall thickness from 0.042 to 0.065-inch.

The Plastic Forming Of Metals

By PROFESSOR DR.-ING ERICH SIEBEL
Translated by JOHN H. HITCHCOCK

Part III—Investigations of Distribution of Deformation and Stress in Technical Forming Processes

2. Distribution of Deformation and Stress in Drawing, Pressing and Piercing*

PRECEDING discussion was limited to the establishment of the position and shape of the ellipsoids of deformation in the deformed bodies, without consideration of the distribution of deformation. In determining the magnitude of the actual total deformation to which each element of the body is subjected during the process of deformation, the manner in which the deformation proceeds must be examined at each point of the region of deformation. The additional shear displacements are accompanied by a rotation of the elements of the body, so that the direction of deformation in the elements varies during the forming process. The deformation determined by the axis-ratio of an ellipsoid of deformation, therefore, is by no means required to represent the sum of all individual deformations of the body element during its passage through the forming zone.

Why Problem Is Important

The solution of this problem appears to be of special importance, for the reason that it will permit the determination of the "effective displacement of volume," and therewith, of the internal work of deformation in the various forming processes. Assuming that in the zone of deformation the difference between the largest and smallest principal stresses has a constant value, k_f, (shear stress theory), the work, A, required for the deformation of each infinitesimal part of the volume, as shown in Part I, section 4, is proportional to the displaced volume, V_d, determined as the product of the volume of the body and the maximum absolute principal deformation. If the principal deformations in the element of volume do not proceed in the same direction during the entire process of forming, the sum of the individual deformations then must serve as the basis for the calculation of the effective displacement of volume.

In the continuous forming processes, all stages of transition during deformation can be studied, with the help of the method of investigation previously described, by determining the alteration which is produced during the process of deformation in the scribed co-ordinate network. The lines of the co-ordinate system, which are parallel to the direction of movement of the bar or the forming tool, can be considered as stream lines; or, in bodies of rotational symmetry, as sections through stream tubes which enclose annularly the central axis of the test body. Each element of the body, as it moves along a stream line in the forming zone, passes through all stages of deformation from the initial to the final condition. It therefore is possible, with close approximation, to proceed from the assumption that the average deformation within the stream tube is equal to the deformation of an element of the body lying in the central plane of that tube. The monentary condition of deformation of each body element then is determined by the distance of the stream lines from one another and from the axis of the bar, as well as by the angle which the transverse lines of the network, originally perpendicular to the stream lines, form with the latter.

If the original distance between successive stream lines is designated as b_o, and if the corresponding distance, at a point which is displaced by the length s with respect to the original cross section in the stream tube, is designated as b_s, then the deformation in the radial direction up to this point is:

$$\phi_r = \log_e \frac{b_s}{b_o}.$$

Similarly, the deformation in the tangential direction in bodies of rotational symmetry, supposing that the original distance r_o of the stream line in question from the central axis is transformed to r_s, is found to be:

$$\phi_t = \log_e \frac{r_s}{r_o}.$$

The deformation in the direction of the stream line (elongation), from the condition of constant volume, may be stated finally as:

$$\phi_l = -(\phi_r + \phi_t)$$

The direct determination of the elongation from the change of distance between the transverse lines of the co-ordinate network is simpler. The additional shear displacements at each point, finally, are characterized by the tangent of the angle of inclination δ between these transverse lines and the stream lines.

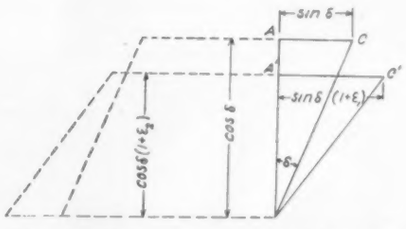


Fig. 137—Influence of deformation on angle of displacement

Form Is Established

According to the previous methods of consideration, the stated problem is to be solved in such a way as to establish the form which a sphere of unit radius assumes if it is displaced from the point considered by an infinitely small distance, ds, along the stream line. The principal axes of the resulting ellipsoid of deformation correspond then to the principal directions of deformation. If now the functions $\phi_r = f(s)$, $\phi_t = f(s)$ and $\phi_l = f(s)$ are known by means of tests, the deformations of the sphere in the direction of and normal to the stream line, in a further movement, ds, can be determined as the product of ds and the first derivative of the foregoing function after the movement, because these functions themselves, represent the sum of all individual deformations during the displacement, s. With regard to the additional shear displacements, the relations are more complicated, because of the fact that, in further movement along a stream line from s toward s+ds, under the influence of the radial and axial deformations, changes take place in the tangent of the angle of inclination which correspond to no effective displacement.

Referring to Fig. 137, if a parallelopiped undergoes elongation (ϵ_z) and spreading (ϵ_x), the tangent of the angle of inclination δ is then changed to $\tan\delta + \Delta\tan\delta$. In the

*Developed according to E. Siebel and H. Huhne[109].

triangle ABC, the relation is observed:

$$\tan\delta = \frac{AC}{AB} = \frac{\sin\delta}{\cos\delta},$$

and in the triangle A′ BC′

$$\tan\delta + \Delta\tan\delta = \frac{A'C'}{A'B} = \frac{\sin\delta(1+\epsilon_2)}{\cos\delta(1+\epsilon_2)}.$$

If the deformations are infinitely small, then:

$$\tan\delta + d\tan\delta = \tan\delta(1+\epsilon_1-\epsilon_2)$$
$$d\tan\delta = \tan\delta(\epsilon_1-\epsilon_2).$$

For the change of the tangent resulting from the elongation and spreading of a body element during the displacement ds, the equation is accordingly obtained:

$$\vartheta' = \tan\delta\left(\frac{d\phi_l}{ds}ds - \frac{d\phi_r}{ds}ds\right).$$

If the measured changes of the tangent during the movement ds accordingly amount to

$$\vartheta'' = \frac{d\tan\delta}{ds}ds,$$

only the portion

$$\vartheta = \vartheta' - \vartheta'' = \frac{d\tan\delta}{ds}ds - \tan\delta\left(\frac{d\phi_l}{ds}ds - \frac{d\phi_r}{ds}ds\right)$$

is effective as additional shear displacement during the deformation of the sphere in question.

The problem, therefore, now is reduced to determining the magnitude and direction assumed by the principal axes of the ellipsoid of deformation, which is formed from a sphere of unit radius as a result of the deformations in the direction of and normal to the stream lines:

$$\frac{d\phi_l}{ds}ds = \epsilon_1 \quad \ldots\ldots\ldots\ldots (68a)$$

$$\frac{d\phi_r}{ds}ds = \epsilon_2 \quad \ldots\ldots\ldots\ldots (68b)$$

$$\frac{d\phi_t}{ds}ds = \epsilon_3 \quad \ldots\ldots\ldots\ldots (68c);$$

as well as by the additional shear displacement:

$$\frac{d\tan\delta}{ds}ds - \tan\delta(\epsilon_1-\epsilon_2) = \vartheta \quad (68d).$$

In a plane of symmetry passing through the axis of the bar, referring to Fig. 138, the infinitely small elongation ϵ_1 produces a change of length

$$\epsilon' = \epsilon_1 \times \cos^2\alpha \quad \ldots\ldots\ldots\ldots (69a)$$

in a radius A—O of the cross section of the original sphere, the radius having unit length and forming any angle α with the stream line designated by the arrow. Similarly, the transverse deformation ϵ_2 produces a change of length in the radius in question, which is equal to:

$$\epsilon'' = \epsilon_2 \times \sin^2\alpha \quad \ldots\ldots\ldots\ldots (69b).$$

Finally, an additional shear displacement ϑ leads to the change of length:

$$\epsilon''' = \vartheta \times \sin\alpha \times \cos\alpha \ldots\ldots (69c).$$

The total deformation of the radius, A—O, accordingly amounts to:

$$\epsilon = \epsilon' + \epsilon'' + \epsilon'''$$
$$\epsilon = \epsilon_1 \times \cos^2\alpha + \epsilon_2 \times \sin^2\alpha + \vartheta \times \sin\alpha \times \cos\alpha \ldots\ldots\ldots\ldots (70).$$

If α varies continuously, $\epsilon = f(\alpha)$ likewise varies continuously, and passes with the angle through maximum or minimum values which corresponds to the principal directions of deformation. The first derivative of the equation therefore must become equal to zero for the angle considered. The angle, which the principal directions of deformation form with the stream lines, accordingly is obtained from the equations:

$$\frac{d\epsilon}{d\alpha} = -\epsilon_1 \times \sin 2\alpha + \epsilon_2 \times \sin 2\alpha + \vartheta \times \cos 2\alpha = 0;$$

$$\tan 2\alpha = \frac{\vartheta}{\epsilon_1 - \epsilon_2}.$$

Finally, if the quantities ϵ_1, ϵ_2 and ϑ are replaced by the corresponding terms of equations (68), the result is:

$$\tan 2\alpha = \frac{\frac{d\tan\delta}{ds} - \tan\delta\left(\frac{d\phi_l}{ds} - \frac{d\phi_r}{ds}\right)}{\frac{d\phi_l}{ds} - \frac{d\phi_r}{ds}} = \frac{\frac{d\tan\delta}{ds}}{\frac{d\phi_l}{ds} - \frac{d\phi_r}{ds}} - \tan\delta \quad \ldots\ldots (71).$$

The principal directions of deformation at any point of a stream line thereby are given directly from the first derivatives of the deformations and shear displacements after the deforming movement, consideration being given to the momentary condition of deformation, which is characterized by tan δ.

If the angle α determined according to equation (71) is substituted in equation (70), in which ds is set equal to unity, the principal deformations in the plane of symmetry during this displacement, or the derivative $\frac{d\phi_h}{ds}$ of the principal deformation after the displacement movement, are obtained. If these partial deformations are plotted against the displacement movement, s, as abscissa, the total deformation of each infinitesimal part of the volume during its passage through the forming zone can be determined by measuring the resulting area with a planimeter.

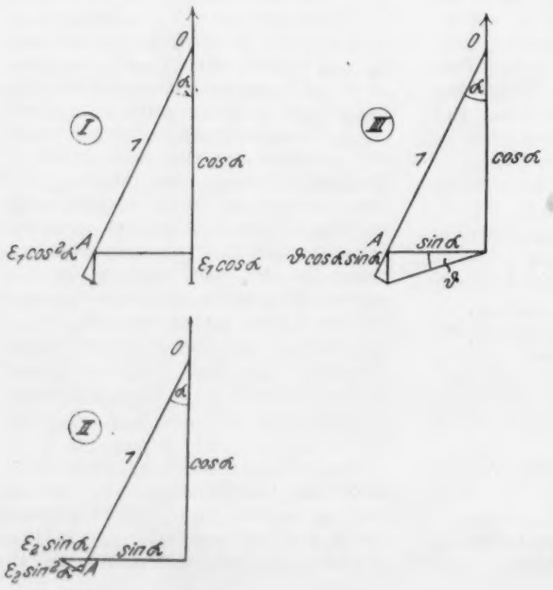


Fig. 138—Scheme of deformation

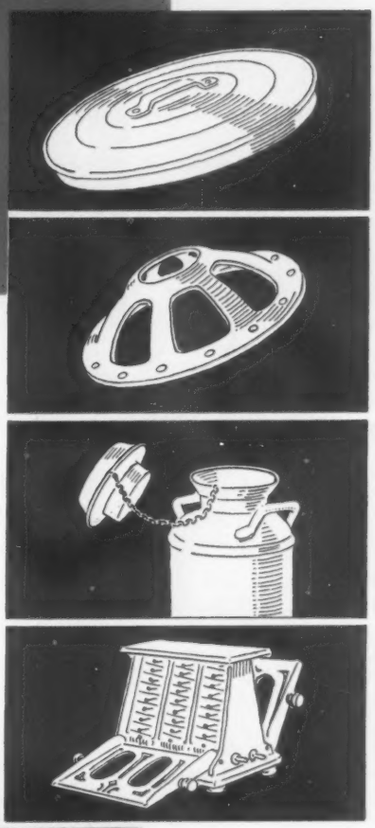
Energy Is Determined

The total energy supplied for a forming process, after deduction of the mechanical losses in the driving unit, etc., serves first for the deformation of the body (work of internal forming), and second for overcoming the external frictional losses. The first portion now can be calculated, with knowledge of the effective total deformation, ϕ_h, of each body element, dV, as well as of the deformation strength, k_f, from the relation:

$$A = \int_0^V k_f \times \phi_h \times dV \ldots\ldots\ldots (72).$$

If the directions of deformation at all points in the zone of deformation are established according to equation (71), comprehensive conclusions can be drawn concerning the distribution of stress which prevails in this region. The principal directions of deformation must coincide everywhere with the principal stress directions, because the lack of shear displacements excludes even the existence of shear stresses in these directions or in the plane normal to these directions. Accordingly, if the principal directions of deformation are known at a sufficient number of points, the slopes of the stress trajectories in the zone of deformation also can be determined thereby.

FOR THOSE PRODUCTS THAT CAN BE MADE BETTER FROM ★ STRIP



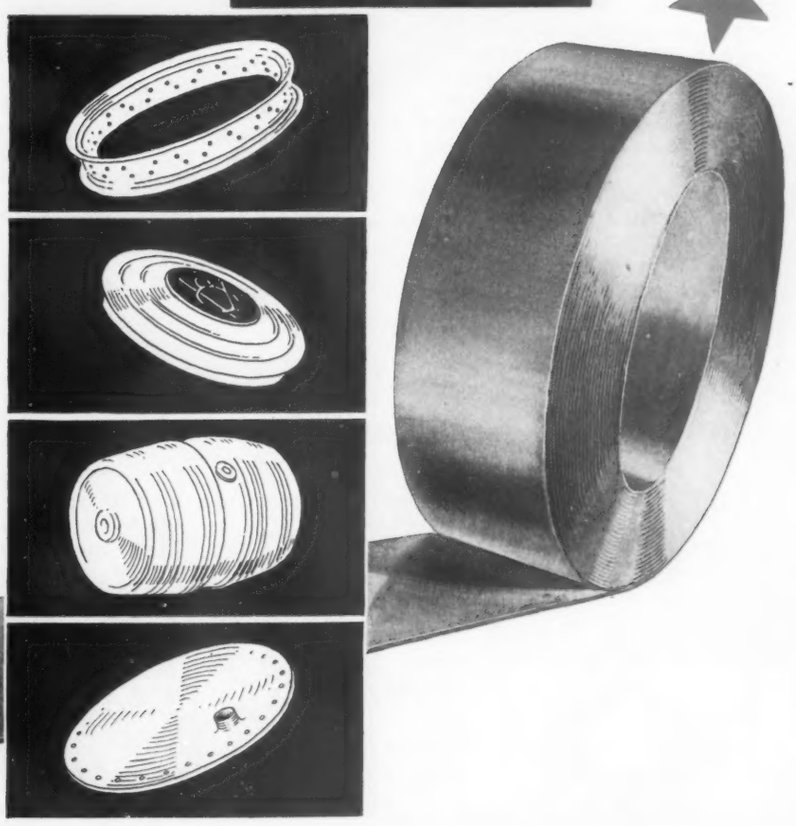
The advent of the modern kitchen range and refrigerator opened a new market for Republic Strip Steel—for legs, for trim and for other parts. A large manufacturer of water heater tanks now stamps the tank heads from strip instead of sheets and cuts down waste.

These are only two instances out of thousands that might be quoted where Republic Steel Strip is helping to make better products at lower cost.

Republic Steel makes strip in many grades—hot rolled strip with a finish far superior to that ordinarily found on this grade—cold rolled strip—Toncan Iron strip for rust-resistant applications—tin plate in many finishes—Sil-con Strip Steel for the electrical industry—and strip of Enduro, Republic's Perfected Stainless Steel, in a variety of polishes.

Strip steel is easier to handle. It cuts down material losses. It speeds up production. It insures uniformity in the product. It shows up as a saving on the cost sheets.

A representative will talk to you at your convenience and tell you more about the advantages of the grades of Republic Strip that will fit into your line of products.



REPUBLIC STEEL
CORPORATION
GENERAL OFFICES: YOUNGSTOWN, OHIO

With knowledge of the stress condition at the edge of the region of deformation, and considering the relations established by Lode[18], as well as by Ros and Eichinger[19], for the interdependence of the principal stresses and the deformations, it then must be possible to calculate the stress distribution in the zone of deformation. In continuous forming processes, however, the region of plastic deformation always is enclosed by an elastically-stressed region, in which no conclusions regarding the conditions of deformation and stress can be drawn by the methods used here. However, since the difference between the largest and smallest principal stresses in the region of deformation has an approximately constant value, a satisfactory qualitative opinion of the stress distribution can be formed from the slopes of the stress trajectories, even without exact calculation.

Extensive Evaluation Difficult

In practice, the described calculations are difficult in these parts of the zone of deformation in which large shear displacements take place. Exact evaluation requires such extensive subdivision of the scribed co-ordinate network in these regions that it cannot be carried out because of the experimental technique involved. In most cases, therefore, one must be satisfied to determine the distribution of deformation in the individual stream tubes for various forming processes, and to forego a more extensive evaluation.

From the distortions of the scribed co-ordinate network reproduced in Fig. 139, the distribution of deformation was determined in the described manner for a drawing test, in which a reduction of area of 27.8 per cent was made in a die having an opening angle of 40 degrees. The deformation in the direction of and normal to the stream lines (elongation and spreading), as well as the shear displacement, are represented in Fig. 140 as functions of the movement of deformation.

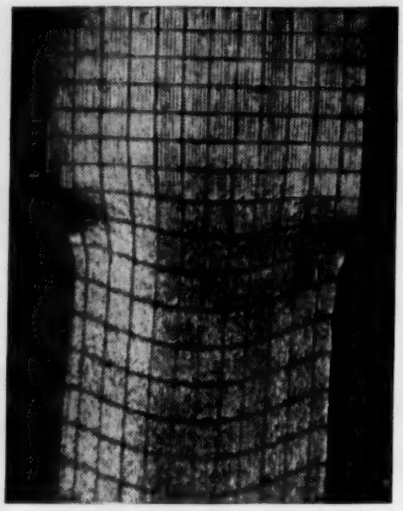


Fig 139—*Deformation zone in drawing* (*reduction* = 27.8 *per cent, die angle* = 40 *degrees*)

(To be continued)

Engineers Will Discuss Processing of Steel

Many interesting papers dealing with the heating, annealing, cleaning and coating of steel and with refractories and insulation are included in the program of the spring engineering conference of the Association of Iron and Steel Electrical Engineers to be held under auspices of the combustion engineering divison at the Ohio hotel, Youngstown, O., April 11 and 12.

The program follows:

Wednesday Evening, April 11

"Temperature Distribution in Electric Furnaces Compared to Fuel Fired Furnaces," by W. Scott, special representative, Westinghouse Electric & Mfg. Co., Mansfield, O.

"Use of Electric Furnaces for Box Annealing," by A. N. Otis, industrial engineering department, General Electric Co., Schenectady, N. Y.

"Utilization of Batch Furnaces for Heating," by T. B. Bechtel and M. H. Mawhinney, Electric Furnace Co., Salem, O.

Thursday (All Day), April 12

Registration, Chairman C. A. Thayer, chief engineer, Republic Steel Corp., Youngstown, O. Secretary, R. E. Lewis, electrical superintendent, Youngstown Sheet & Tube Co., Youngstown, O.

"Tube Type Annealing Furnaces," by Lee Wilson, president Lee Wilson Engineering Co., Cleveland.

"Heat Resisting Castings," by Dr. F. A. Fahrenwald, Chicago.

"Hot Galvanizing in Connection with Sheets," by Nelson E. Cook, general superintendent, galvanizing operations, Wheeling Steel Corp., Wheeling, W. Va.

12:15 P. M.

Luncheon at Ohio Hotel, Youngstown, O.

"Pickling, as an Operation and Practice," by H. G. Hobbs, steel service division, Grasselli Chemical Co., Cleveland.

"A New Technique in Acid Handling," by J. R. Hoover, assistant manager, chemical sales division, B. F. Goodrich Rubber Co., Akron, O.

"Blast Cleaning of Steel," by W. A. Rosenberger, chief engineer, Pangborn Corp., Hagerstown, Md.

"Cleaning of Steels," by E. A. Rich, vice president, American Foundry Equipment Co., Mishawaka, Ind.

"Super Refractories in Connection with Heat Treating Furnace," by E. C. Lloyd, Armstrong Cork and Insulation Co., Lancaster, Pa.

"The Use of Super Refractories for the Iron and Steel Industry," by W. F. Rochow, Harbison-Walker Refractories Co., Pittsburgh.

"Insulating Firebrick Applications in Steel Heating Furnaces," by M. J. Terman, refractories engineer, Babcock & Wilcox Co., Pittsburgh.

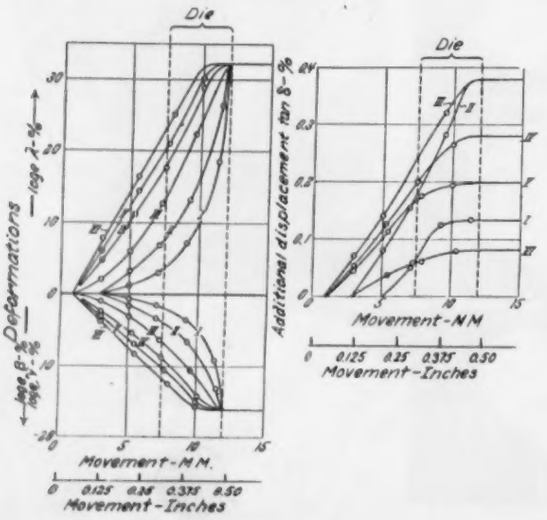


Fig. 140 — *Deformations and displacements in drawing* (*see Fig.* 139)

A.S.T.M. 1933 Proceedings Fill Two Large Volumes

Proceedings of the American Society for Testing Materials, 1933, in two volumes, Vol. I 1092 pages and Vol. II 804 pages, 6 x 9 inches, published by the American Society for Testing Materials, Philadelphia, and supplied by STEEL, Cleveland, for $5.50 per volume in heavy paper, $6 in cloth and $7 in leather, plus 15 cents for postage, and in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

Part I contains annual reports of 40 standing committees, as well as research and sectional committees. Information is presented on various subjects in the ferrous metals field, including the following: Steel, wrought iron, gray cast iron, heat treatment, effect of temperature, corrosion, malleable iron castings, iron-chromium-nickel and related alloys, zinc coatings and magnetic properties.

Part II contains all of the formal technical papers presented at the 1933 annual meeting in Chicago, and also extensive oral and written discussions on the papers. The symposium on cast iron, which was sponsored jointly with the American Foundrymen's association, and was prepared by authorities also is included in the text.

Contrast the High Cost of Corrosion with the Low Cost of

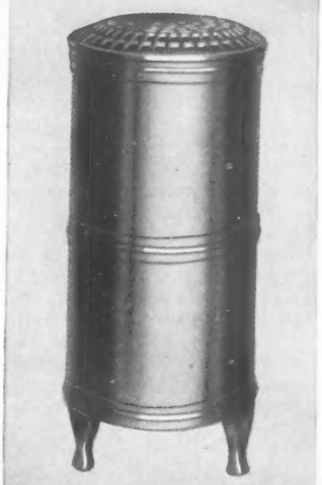
INLAND COPPER-ALLOY STEEL

THE ADDITIONAL cost of Inland Copper-Alloy Steel is so low that corrosion does not need to be especially rapid in order for Copper-Alloy to be a profitable investment. It costs only a little more than ordinary commercial grades of steel. And copper-bearing steel costs less than any other corrosion-resisting material — far less than most.

This is only the first cost. Since it endures corrosion much longer, copper-bearing steel becomes the most economical material possible to use wherever there is moisture. The low additional first cost of Inland Copper-Alloy Steel is soon eaten up by the high long-run cost of corrosion.

And so it is sound procedure to go into the question of using Inland Copper-Alloy Steel on every application where there is moist air or soil — indoors or out — wherever sheets, bars, plates, or any other rolled steel product is required — whether it is a roof or smoke stack for your own use, or a product that must satisfy a customer.

INLAND STEEL COMPANY,
38 South Dearborn Street,
Chicago, Illinois.



Septic tank, smoke stack, and spiral radiator: typical products made of Inland Copper-Alloy Steel.

INLAND STEEL

ABLE SERVANT OF THE CENTRAL WEST

Sheets Strip Tin Plate
Plates Structurals Piling

Rails Track Accessories
Bars Rivets Billets

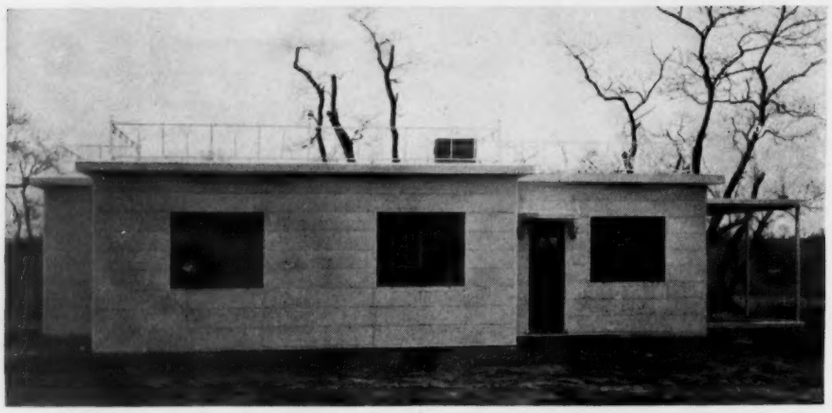


Fig. 1—Six-room steel house built recently in Zanesville, O. The exterior is sprayed with lacquer to provide an attractive finish. According to the manufacturer, this experimental house can be duplicated for $2770

Shop Fabricated Steel House Utilizes 11 Tons of Steel

A NEW type of steel house, designed and constructed to be within reach of the man of small income, was dedicated last December in Zanesville, O., by the Universal House Corp., of that city. This company has been working quietly on the development for more than a year and chose to build its first experimental house in a rather remote section.

The house, shown in Fig. 1, is of one story and consists of a large living room, three bedrooms, bath, dinette-kitchen and a large porch. It approaches the new international type of architecture, and can be duplicated in Central Ohio for $2770, although the policy of the company is to build individually planned custom-built houses.

UTILIZATION of steel in house construction has commanded considerable attention in the past five years. During this period, STEEL *has kept it readers informed of current developments, both as to types of houses designed and market possibilities. On this page are presented illustrations and details of one of the most recent types—a low-cost, shop-fabricated unit. The first experimental house already has been built in Southern Ohio. In early issues,* STEEL *will describe several other steel houses and methods of construction.*

Exterior siding is 16-gage ingot iron, formed in a trough-shaped section to give it rigidity and load carrying ability. Although the first house was built with a tubular frame, the company has now developed a frameless double-strength system which is shown in Fig. 2. The wall units are bolted to the frame and then bolted together through the flanges. Enamel paint is sprayed on the exterior.

Floors and roof are of cellular construction of sheet steel formed in such a way as to provide a light, strong structure. The floor unit is shaped somewhat like the wall, except that the sides of the trough-shaped member are wider. Although these units were assembled on the job, floors hereafter probably will be factory-assembled in large convenient sections. Eleven tons of ingot iron and steel sheets were used in making the various members, this material being supplied by the American Rolling Mill Co., Middletown, O., which co-operated with the Universal Corp. in an advisory capacity.

House Well Insulated

Gypsum board is used as a subfloor over the steel; finished floors are of hard wood, except in the bath where mosaic tile is installed. Window sash, frames, and bucks are of steel. Doors and trim are pine wood. Interior walls are ½-inch wallboard; the space between the wallboard and exterior metal wall being filled with spun glass insulation. Wall covering is applied directly to the wallboard.

The roof is of the built-up asphaltic type, put down over a ½-inch insulating board. Individual owners may select the heating plant, wall finishes, fixtures, and other finishing materials.

Sensing a volume market for factory made, field-assembled houses, the Universal House Corp., of which Edward L. Garrett is president, has started by developing the smaller low-priced units suitable for suburban location. These will be designed in several floor plans. In the higher priced range, however, the company realizes that each house must be planned individually, but even here the benefits and economies of factory production can be obtained. The method of construction is sufficiently flexible to provide variation in plan and architecture.

Uses for Insulation Are Discussed in Booklet

Insulation methods and materials which have proved effective in improving performance and reducing operating costs on all types of industrial furnaces and ovens are described in a 72-page booklet published recently by Johns-Manville, 22 East Fortieth street, New York.

Each particular type of heating equipment is analyzed and recommendations made according to requirements. Core ovens, annealing ovens, continuous conveyor ovens, blast furnace stacks, hot blast mains, open hearth furnace hearths and regenerators, and other steel mill equipment, are considered and insulation specified for each type. Power plant insulation likewise is described.

A section devoted to characteristics and uses of the company's insulating products, including blocks, boards, sheets, paper, pipe insulation, insulating cement, and refractory cement concludes this profusely illustrated booklet.

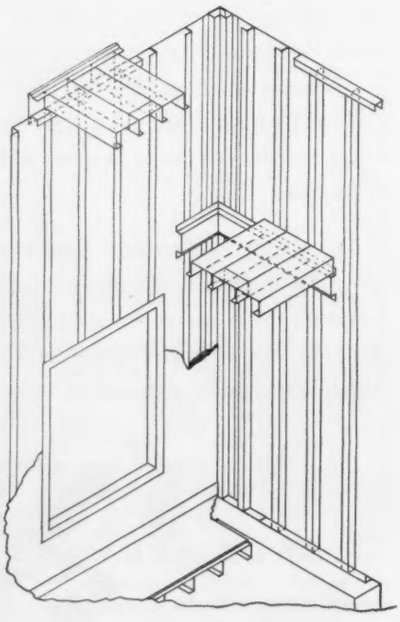
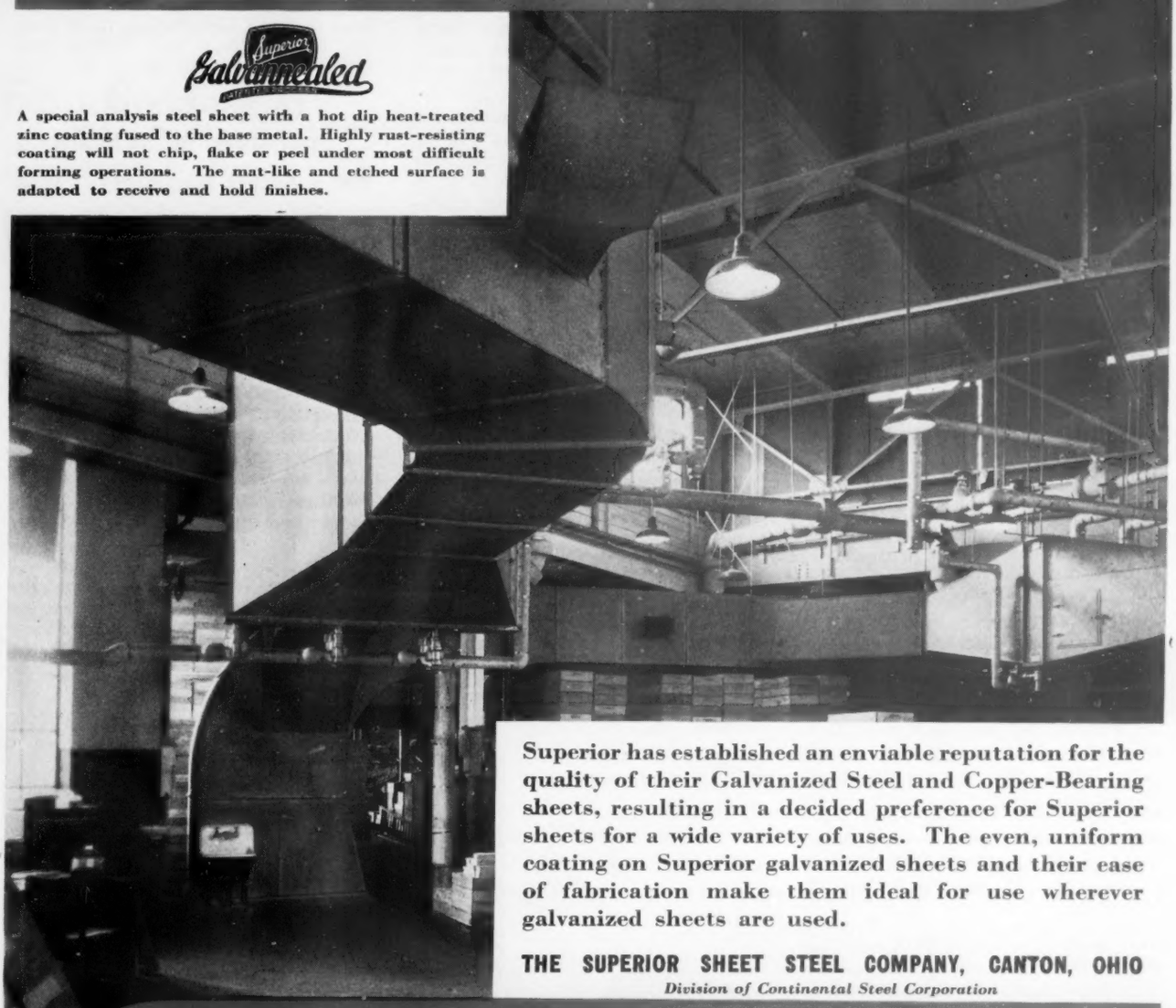


Fig. 2—Section of frameless double-strength steel house construction

SPECIALISTS IN *COATED* SHEETS

Superior Galvannealed

A special analysis steel sheet with a hot dip heat-treated zinc coating fused to the base metal. Highly rust-resisting coating will not chip, flake or peel under most difficult forming operations. The mat-like and etched surface is adapted to receive and hold finishes.



Superior has established an enviable reputation for the quality of their Galvanized Steel and Copper-Bearing sheets, resulting in a decided preference for Superior sheets for a wide variety of uses. The even, uniform coating on Superior galvanized sheets and their ease of fabrication make them ideal for use wherever galvanized sheets are used.

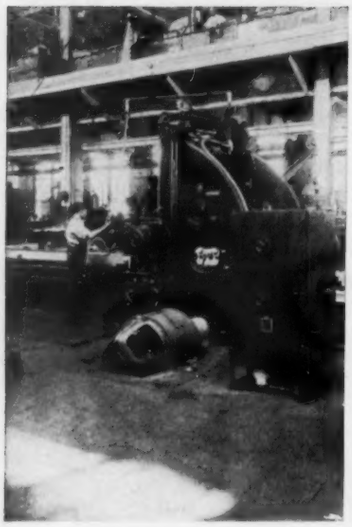
THE SUPERIOR SHEET STEEL COMPANY, CANTON, OHIO

Division of Continental Steel Corporation

SUPERIOR

COATED SHEETS FOR MANUFACTURING PURPOSES

Making the Most *of* METHODS AND MATERIALS



Uses Scrap Materials To Build Up Wheelbarrow

The maintenance and repair department of a parish in a southern state needed new wheelbarrows, but considered a price of over $100 a dozen too expensive. The foreman and his welder believed satisfactory equipment could be fabricated from scrap material on hand at a much lower figure. One wheelbarrow was made up to see how it would look and to get an idea on cost. The wheel was made by cutting off a 2-inch section of 18-inch pipe to form the rim or tire. Two pieces of 2½-inch channel were crossed and welded into the tire, with a hole drilled through the center for ¾-inch pipe as the wheel hub. A hole was drilled and tapped in the hub for a grease cup and a bolt run through the pipe for the axle. The body of the wheelbarrow was made from thin sheet steel, cut and shaped in a concrete form, then the corners were tacked by welding and riveted. The body frame was made of 1-inch pipe, well braced where needed. Assembly was entirely by oxyacetylene welding, bolting and riveting, and only scrap material was employed. So successful did the sample prove that 30 more were made at a cost of $3.08 each, including labor and paint. Others have been built since, bringing the total to about 100.

$ $ $

Heat Treating in Salt Baths Prolongs Life of Tools

Many cases of increased tool life are reported in the field of cutting tools heat treated in internally heated salt baths. One manufacturer reports 750 pieces threaded before regrinding of the tool, as against a maximum of about 400 pieces with tools hardened by former methods. In this case, a furnace setting with four pots is used. The tools are preheated in the first pot at 1400 degrees Fahr., then transferred to the second pot, which is operated at 1850 degrees, the third or high heat pot operates at 2300 to 2350 degrees, and the fourth or quenching pot at 1100 degrees. Heat current is fairly evenly divided between the first three pots, the fourth one being kept hot by work quenched in it, so three single-phase transformers can be connected to a 3-phase circuit. Such a unit with 25 kilovolt-ampere transformers can harden over 200 pounds of high-speed steel hourly.

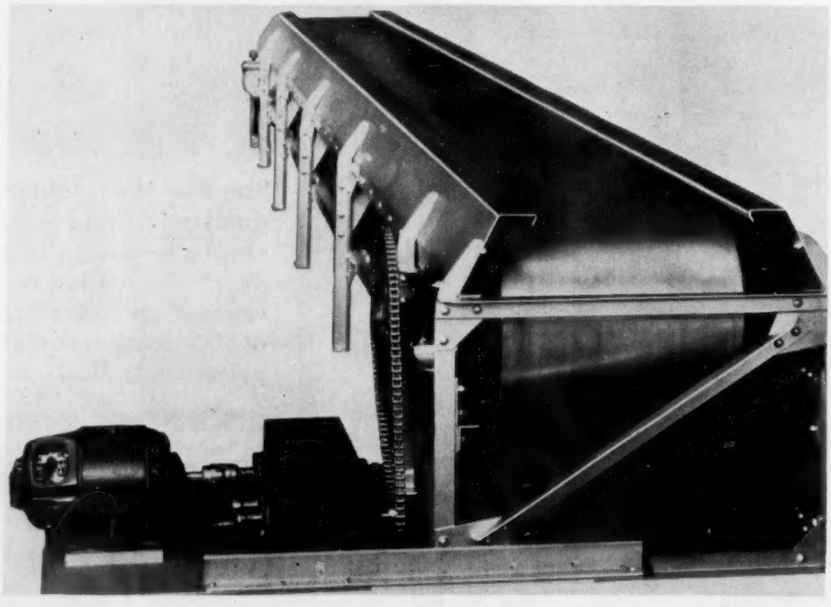
$ $ $

A special drawing solution for lubricating the sheet and dies is required in forming stainless steel and strip. An empirical compound developed by a large automobile manufacturer was found to have excellent properties. It is merely a cup grease softened by paraffin oil, but bodied by such unctuous fillers as talc and lithopone. Sulphur is added, as it acts partly to keep the dies polished and in this way reduces scratches on the work.

$ $ $

Copper-Bearing Steel Sheets For Caskets Cadmium Plated

Following an extensive investigation of many materials, a midwestern casket manufacturer selected lead-coated, copper-bearing steel as the best available material for serviceable caskets. Such caskets were sold for a 10-year period with an honest statement that lead-coated steel was not entirely satisfactory for the reason that the sheets are lead dipped at the rolling mill and when cut for fabrication the edges are exposed and made susceptible to rusting. About 25 pieces are required for the average casket and approximately 139 feet of



STAINLESS BELT RESISTS HEAT, EASY TO CLEAN: Believed to be the largest conveyor ever made of corrosion-resisting steel, the above unit is 30 feet long, between centers, and 24 inches wide, of 26-gage 18-8 chrome-nickel steel, supplied by Allegheny Steel Co., Brackenridge, Pa. Introduced recently by the American Utensil Co., Chicago, the equipment is designed primarily for use in connection with fruit and vegetable packing. The belt has only one joint, of special design which permits easy separation if necessary and allows the belt to pass around the pulleys flexibly. The installation is adaptable to other industries where conveyors are exposed to severe heat and corrosion or where cleanliness is an important consideration

cut edges are exposed. Recently the company found that positive rust protection could be obtained by using cadmium plating, thus eliminating the need for lead-coated sheets. The caskets are first manufactured, then plated as a unit. This insures complete protection on the flat surfaces as well as the edges. A beautiful lacquered finish then is applied over the cadmium plate.

$ $ $

Exhaustive tests conducted by a machine tool manufacturer on two large boring machines, one having bronze bearings and the other antifriction bearings, revealed that the power saved by the full antifriction bearing machine amounted to over 25 per cent. The builder has incorporated 93 ball bearings in this machine.

$ $ $

Alloy Cast Iron Exhibits Strength Under Heat

Authorities believe that a good grade of nickel or nickel-chromium cast iron will retain room temperature strength and load-carrying capacity practically indefinitely at temperatures up to 600 degrees Fahr. Of perhaps greatest importance is the fact that at these temperatures a gradual creep occurs in the metal, with the result that the load-carrying capacity over long periods decreases sharply. For instance, a 2000-hour test on a nickel cast iron possessing 45,000 pounds tensile strength at room temperature shows that its deformation rate in inches per inch reaches zero after 900 hours, whereas a plain gray iron continues to creep all the way up to 2000 hours or the limit of this test. The load in this particular case was 10,500 pounds per square inch, or approximately 25 per cent of the tensile strength.

$ $ $

Strive To Improve Plating

Improvement in quality of chromium plate has been the natural result of intensive study by electrochemists, both in automotive laboratories and by parts manufacturers, and by the realization that a good job costs little more than a poor one. A continued campaign of education has emphasized the importance of many essential factors, such as preliminary cleaning and buffing, sufficiently generous underplates of copper and nickel, and proper control of the chromium tank as to solution, temperature, current density and arrangement of work. One automobile manufacturer measures the thickness of the coatings on a polished cross section in addition to using the salt spray test.

$ $ $

Protecting Lacquer Finish

Lacquer finishes on cast-iron housings or crankcases containing lubricants frequently are damaged by the lubricants seeping through the pores. Where cast metal must be used for this purpose, it is wise to protect the finish by specifying a coat of a lacquer generally known as crankcase sealer to the interior of the housing. This will seal the pores and prevent seepage.

$ $ $

Making Nonmetallic Molds

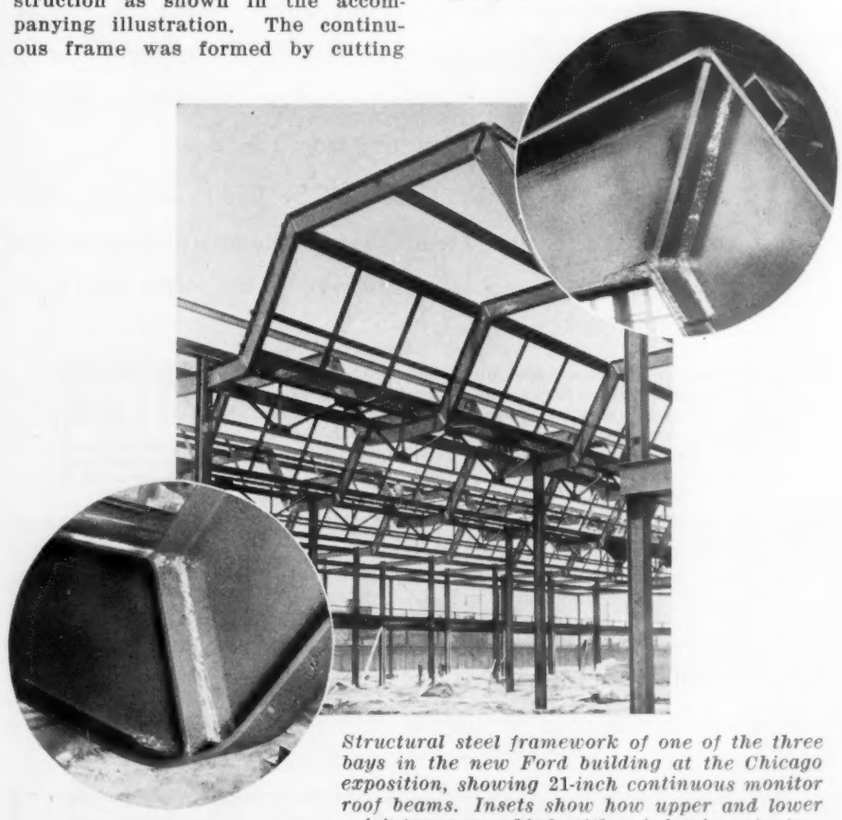
A proprietary composition for nonmetallic molds of the so-called permanent type is composed of 3 parts of chrome ore, 1 part of fused silica, and 1 part of bentonite. The materials are ground finely, mixed with water and then rammed into mold form. The mold is baked under gradually increasing temperature until the latter exceeds 1800 degrees Fahr. for several hours. After cooling, the mold is examined and corrected for accuracy. Before use,

Ford Building at Chicago Fair

USE of continuous 21-inch I-beam monitor frames in the structural steelwork of the new Ford exposition building at *A Century of Progress* in Chicago, an added feature of the exposition this year, has eliminated the maze of steel members required in built-up monitor roof trusses. The building itself, a good example of modern architecture and structural design, is 900 feet long with a central rotunda 110 feet high.

North wing of the building, which will house an industrial exhibit, has three bays with monitor roof construction as shown in the accompanying illustration. The continuous frame was formed by cutting triangular notches through one flange and the web of the beam, with the desired radius cut in the web above the other flange to form a smoothly curved outer bend, as shown in the inset, lower left of the illustration. After cutting, the beams were bent to the proper shape and, with a reinforcing strut on each side of the web, were welded with a 5/8-inch bead.

Cutting was done on a special pantograph cutting machine designed and built by the R. C. Mahon Co., Detroit, which handled the steel contract; the machine is capable of handling and cutting up to 60 feet in length and 6 feet in diameter. Welding was done with machine and electrodes furnished by the Lincoln Electric Co., Cleveland. The building was designed by Albert Kahn Inc., Detroit.



Structural steel framework of one of the three bays in the new Ford building at the Chicago exposition, showing 21-inch continuous monitor roof beams. Insets show how upper and lower joints were welded with reinforcing struts

"Now, we order everything for Oxwelding and Cutting from Linde"

WHICH SUMMARIZES THE EXPERIENCE OF ANOTHER MANUFACTURER WITH LINDE PROCESS SERVICE

"BUSINESS began to increase—rapidly. Production was lagging behind sales. Orders were being lost because of late deliveries. Production had to be doubled in just two weeks.

"The Linde organization was called in to help install a new welding department and assist in organizing welding operations. Linde engineers worked day and night supervising the training of 125 new welders. In two weeks' time the new welders were doubling production! Thousands of dollars in orders were saved!"

This manufacturer's experience is but one of many instances of how Linde Process Service continuously translates proved methods into terms of actual plant requirements and saves money for Linde users. It indicates why countless manufacturers buy everything for oxwelding and cutting from Linde.

The nearest Linde District Office will be glad to help you capitalize on this experience and to illustrate with actual examples from your own industry how Linde Process Service might help you.

LINDE OXYGEN
...plants and warehouses in all industrial centers.
PREST-O-LITE ACETYLENE
...the standard for well over a quarter of a century.
OXWELD APPARATUS AND SUPPLIES
...available for every oxy-acetylene welding and cutting operation.
UNION CARBIDE
...sold in the familiar Blue and Grey drum from over 250 warehouse stocks.

Users of products and processes developed by Units of Union Carbide and Carbon Corporation benefit from a most unique coordination of scientific research with manufacturing, sales, and service facilities. You are cordially invited to visit this summer the numerous exhibits sponsored by the Corporation in both the Basic and Applied Science sections in the Hall of Science at Chicago's 1934 A Century of Progress Exposition.

PRODUCT OF A UNIT OF UCC UNION CARBIDE AND CARBON CORPORATION

THE LINDE AIR PRODUCTS COMPANY

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126 Producing Plants UCC 627 Warehouse Stocks

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the mold surface is coated with finely ground clay suspended in sodium silicate, dried, and then coated with lampblack. The latter coating is repeated between casts.

New Type Floor Material Resists Severe Wear

A heavy-duty flooring which combines the desirable qualities of asphalt and concrete has been developed recently by the Continental Asbestos & Refining Co., 1 Madison avenue, New York.

This new product, designated as "Stonoleum," is mixed with ordinary aggregate, approximately 1 pound covering 1 square foot. It will bond to either rough or smooth surfaces, thus it is adapted to covering old work, patching, or laying new floors. According to the manufacturer, the material will not crack, break, splinter or crumble; is resilient, flexible and fire-resisting. Rapid drying qualities make it possible to use the floor 48 hours after application.

New Copper Alloys Respond To Heat Treatment

A series of new copper alloys, developed in the laboratories of I. C. I. Metals Ltd., Millbank, London, S. W. 1, are said to possess the feature that by simple heat treatment their hardness, strength and other mechanical properties can be considerably improved. Marketed under the trade name "Kunial," the series covers brass, copper, nickel-silver and bronze.

Commonly used copper alloys are annealed and softened by raising them to temperatures in the region of 400 to 600 degrees Cent. With the new alloys, however, it is stated that similar heat treatment may treble the hardness and double the tensile strength. In spite of this marked difference, the alloys may be extruded, rolled, drawn and cold worked exactly in the same way as ordinary brass for the production of rod, wire, tubes, strip and sheet. All of the alloys possess a high resistance to corrosion by sea water.

The new brass, which is one of the most important of the series, is an alloy of copper and zinc with an addition of other elements which impart to the metal its unusual properties. The copper and zinc contents may be varied within wide limits, thus modifying to some extent the basic properties of the alloy, but in all cases the property of hardening and strengthening by suitable heat treatment is retained.

Presents Information on Selection of Shafting

General information on the manufacture and application of four grades of shafting is presented in a 16-page booklet published by the Union Drawn Steel Co., Massillon, O. The purpose of the information is to acquaint users with the various grades of shafting available and to aid them in selecting the grade best suited to particular requirements.

Commercial cold-drawn, turned and polished, special-finish, and precision shaftings, manufactured by the company, are compared as to their method of manufacture, physical properties, permitted variations from specified diameters, warpage and surface finish. Several illustrations, showing applications and production of shaftings, and a table recommending keyway sizes for various shaft diameters are included.

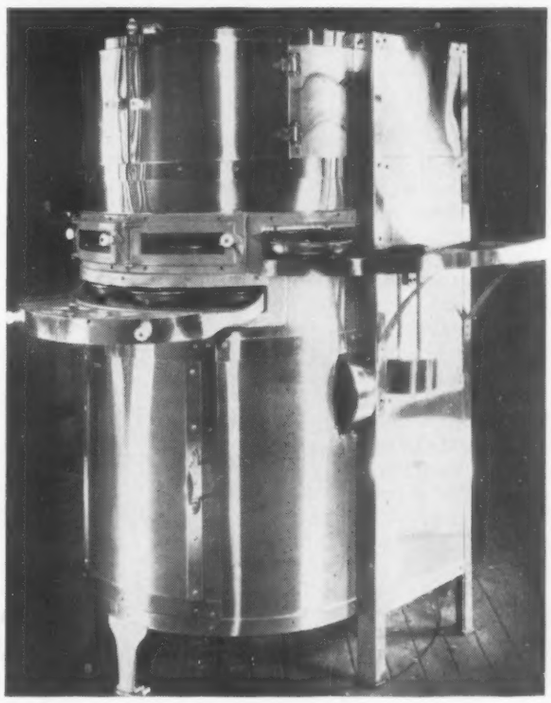
Tungsten Alloys Covered In New Monograph

Alloys of Iron and Tungsten, by J. L. Gregg; cloth, 511 pages, 6 x 9 inches; published by McGraw-Hill Book Co. Inc., New York, for the Engineering Foundation; supplied by STEEL, Cleveland, for $6, plus 15 cents for postage; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

This is the third volume of the monograph series on ferrous alloys undertaken by the iron alloys committee of the Engineering Foundation as part of the Alloys of Iron Research. The first volume, published in 1932, was on alloys of iron and molybdenum, the second, published in 1933, on the alloys of iron and silicon.

In preparing the monograph more than 1800 articles on the subject were found and more than 1300 abstracts were made. The selected bibliography presented in this volume gives reference to 566 of these. Reference numbers in the text indicate the source of various statements made therein.

Preparation of this volume was undertaken by Battelle Memorial institute as part of its contribution to Alloys of Iron Research. American and foreign metallurgists contributed



STAINLESS COOKER KEEPS ENTREES HOT: Developed from an original design of the late Albert P. Stalle, for 18 years famous chef of the College Inn of the Hotel Sherman, Chicago, and now marketed by Alex Janows & Co., Chicago, this cooker is kept clean and bright in appearance by use of 18-8 chrome-nickel steel exterior, material being supplied by Republic Steel Corp., Massillon, O. When an order of meat or fish is to be cooked, it is placed in the hot casserole which is then deposited in the cooker upon a revolving table. Cooking chamber is heated by gas burners to about 500 degrees Fahr. After one revolution the casserole is ejected automatically upon a shelf at the side. Length of time the food is in the cooker is varied by placing the casserole in one of three windows which shorten or lengthen the amount of revolution of the cooking disk. Capacity is 120 casseroles per hour

much unpublished information and detailed opinions regarding conflicting data.

Tungsten alloys include those with iron and carbon in various combinations, tungsten steel, including magnet, tool, die, and high-speed steels. For each is given the development, nature and properties of the alloy at varying temperatures and conditions. Miscellaneous alloys also are covered.

The effort has been to present all the information concerning the subject as far as it has been developed and could be made available.

Report Reviews Impact Testing of Cast Iron

An extensive report on the usefulness of the several forms of impact test as applied to cast iron has been published by the American Society for Testing Materials. Research work, extending over three years, and correlation of data were handled by subcommittee XV on impact test of A. S. T. M. committee A-3 on cast iron. This group enlisted the cooperation of other workers in the field of cast iron.

Some 500 test bars were specially cast, machined and tested by the several methods investigated, employing the various types of machines in commercial use. Results of the transverse, tension, fatigue, compression and shear tests which were made, are tabulated and by the use of charts and illustrations, these data are condensed in convenient form.

Notched and unnotched Charpy and Izod tests were run, as well as repeated blow and drop tests. A chapter on the microstructure of irons in the impact investigation is included.

Conclusions of the committee in charge and comments by several metallurgists and engineers greatly enhance the value of this 51-page report, copies of which may be obtained at 50 cents each from the society's headquarters, 260 South Broad street, Philadelphia.

Arc Welding by Alternating Current And Direct Current Are Compared

By J. F. Lincoln
President, Lincoln Electric Co., Cleveland

ADVANTAGES and disadvantages of alternating and direct current arc welding have been a subject of discussion among welding engineers for many years. Because alternating current is used so generally for light and power, some have felt that it should be advantageous to use alternating-current welders. Why is it, then, that most arc welding is done with direct-current generator sets and the term "arc welding," as generally used, refers to direct-current arc welding?

A large manufacturer's use of alternating current with shielded arc electrodes in a welding job at Boulder dam has revived to a considerable extent the waning interest in alternating-current arc welding. The fact that under certain conditions with certain types of covering for shielded arc electrodes a less porous weld can be obtained with alternating current than with direct current under the same conditions also has tended to increase this interest.

A consideration of the fundamentals involved, however, does not indicate that there is going to be any extended use of alternating current for any type of arc welding. The facts involved are of interest.

While it is theoretically possible to make a shielded arc electrode which will work successfully on alternating current, it is not possible, as far as is known at the present time, to make such an electrode with as good results in its operation as is obtained with an electrode which is definitely made for either positive or negative operation. It is evident that if a rod will give better results working either positive or negative to the work, that when it is changed from positive to negative 120 times a second, the results obtained will not be as good as if worked on the proper polarity continuously. Since it is true that the best coatings known for shielded arc rods will make the rod definitely either a positive or negative electrode, it is evident that operating on alternating current will not give best results.

Porosity Is Lessened

The feature which seemingly has indicated that alternating current does have advantages over direct current in the arc is the fact that with certain electrodes under the condition of multiple passes in the same weld less porosity is obtained with alternating current than with the proper single polarity. This is because alternating current will give somewhat less penetration into the metal already deposited than will the proper polarity on the same rod.

The weld under these conditions will lose less carbon and manganese because of the less penetration and, therefore, it may have less porosity. If the same rod were used on the reverse polarity to that for which it was designed, less penetration would be obtained than with alternating current. Under these conditions still less tendency toward porosity would be observed, although there would be a grave question whether proper uniting of the beads would be accomplished.

Arc Characteristic Inferior

The obvious difficulty with alternating current welding in addition to the one listed above is, of course, that it necessitates a very low power factor current from single phase, thus unbalancing the supply system and probably increasing materially the cost of power, but more important still is the fact that the arc characteristic is not good for the obvious reason that the heat distribution can never be anything else than practically equal between the two electrodes, and that an alternating-current arc characteristic is not nearly as good as a direct-current arc.

Because of this, in all cases the designer of the rod must keep in mind first of all that he must overcome this arc operation difficulty, which is an added feature that must be included in his coating before he can design the coating to shield the metal. The two objects to be obtained usually are conflicting.

It has been proved definitely that under all conditions of welding better results can be obtained with a proper direct current than can be obtained with any alternating-current arc. The characteristics and results have been sufficiently studied so that the controlling factors are known.

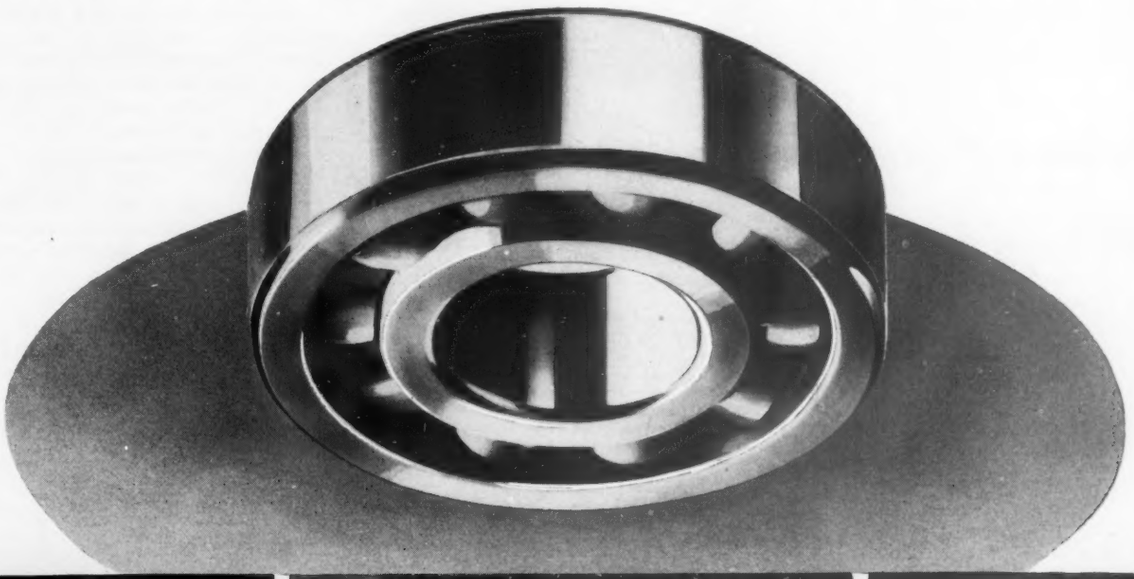
Attractive Murals Done In Porcelain Enamel

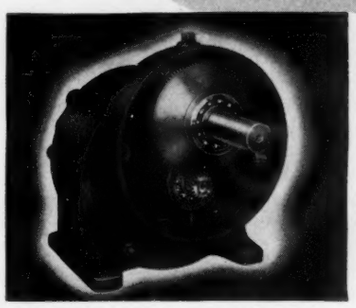
Decorative murals, made of porcelain enamel on 18-gage ingot iron, are reproduced in a pamphlet published recently by the Ferro Enamel Corp., 4150 East Fifty-sixth street, Cleveland.

Ten of these murals, designed and executed by H. Edward Winters, prominent Cleveland artist, have been hung in the company's offices and in its architectural exhibit in the Builders' Exchange building, Cleveland. Second in size only to those hung recently on the outside of Music hall, Radio City, New York, they are 3 x 5½ feet and in lasting colors, depict scenes in the company's factory and laboratories and

With higher costs modernization is now vital!

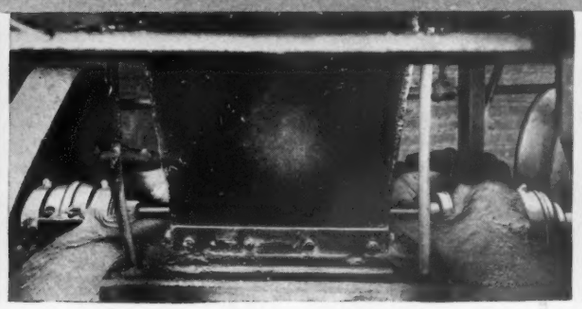
This increased labor cost! How will it be paid? How can we make a profit despite rising material costs? Prices must be such that demand for our products will grow, or the jobs already created will be jeopardized. But under the N.R.A. we must sell at a profit. How can this be done? We must turn to those to whom the worker and manufacturer owe so much—the machinery manufacturers of America. They have never ceased developments. They have produced equipment which provides profit despite curtailed volume. And plants with such equipment are ready with very favorable costs. They have found the answer with such machines as are shown below.





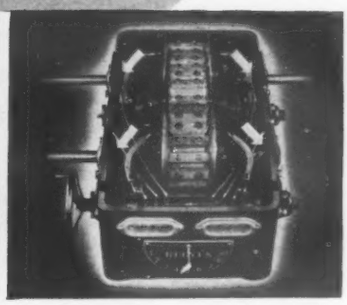
The Westinghouse Gearmotor for efficiency

Compactness, flexibility, simplicity and low upkeep—these features of the Gearmotor have helped it solve many transmission problems with the aid of Fafnir Ball Bearings.



25% less power on this breaker

Modernization of their soda ash breaker through the use of Fafnir Ball Bearing Pillow Blocks, produced this saving for the Los Angeles Soap Company. No maintenance has been needed for 3 years.



Reeves Transmission for variable speed

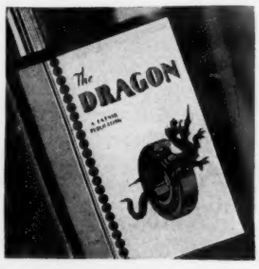
Infinite speed control from a fractional to 125 H. P. is supplied by Reeves. A profit producer which provides dependability with the aid of Fafnir Ball Bearings.

Sanford-Day cuts handling costs

A new mine car with Fafnir mine car wheel bearings is doing its share in making profits for the mines. Less tractive power is required . . . longer life is assured . . . both maintenance and lubricant required have been greatly reduced.

2½ H.P. saved every 40 ft. line shaft

H. P. Snyder Mfg. Co. obtained this profit with 6 Fafnir Hanger Boxes—$92.00 a year saved on power alone. In lubricant $2.40 a year less—greasing 4 times a year instead of weekly oilings. Of course they bought more—it pays.



Modernization of machines is discussed in "The Dragon" No. 190. A copy is yours for the asking.

Let us cooperate—what has been done for others can quite likely be done for you. We will gladly help you save through modernization whether it be machinery or power transmission equipment. Just drop us a line. THE FAFNIR BEARING COMPANY, *New Britain, Conn.* Atlanta . . Chicago . . Cleveland . . Dallas . . Detroit . . Milwaukee Minneapolis . . New York . . Phila.

FAFNIR BALL BEARINGS

general subjects scenes in the company's factory and laboratories and general subjects fitting in with decorative schemes of the offices.

Gears and Speed Reducers Listed in New Catalog

Complete information on industrial gears and speed reducers is presented in a comprehensive 448-page catalog just published by the Horsburgh & Scott Co., 5114 Hamilton avenue, Cleveland. In addition to all the material contained in previous editions, the new book incorporates several new features.

Some of the additions are: A complete listing of standard gears in industrial use, tabulation of standard circular pitch spur gears, standard worms and worm gears, safe tooth loads and horsepower ratings for each standard gear, and a list of stock hobs for worm gears.

This attractive book catalogs gears and speed reducers under separate sections, the former including engineering data, spur gears, welded steel gears, nonmetallic pinions, internal gears, racks, mitre gears, bevel gears, helical gears, herringbone gears, worms and worm gears and sprockets. The latter section covers various types of speed reducers, mountings, bed plates, and couplings.

Numerous halftones and sketches illustrate the gears listed. For ready reference a complete index is provided. Accompanying the catalog is a discount sheet and speed reducer price list effective Feb. 15.

Develops Apparatus for Removing Dust from Swing-Frame Grinders

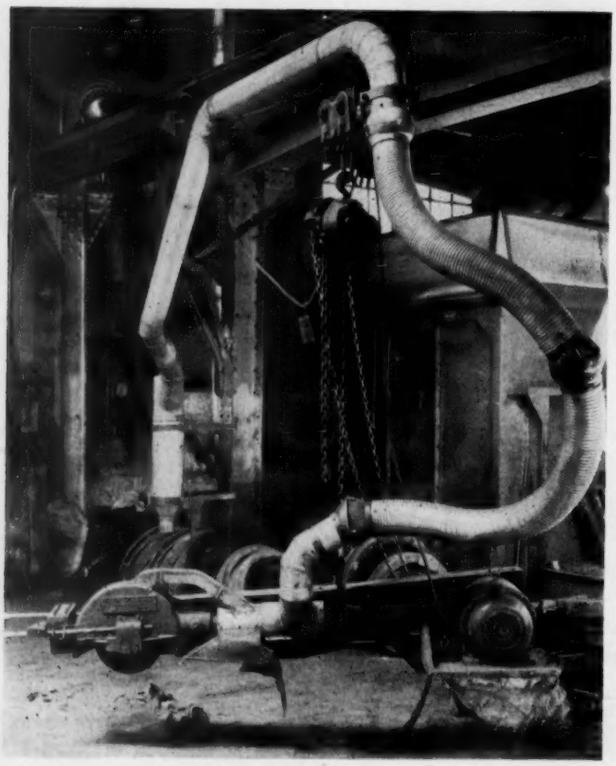
COLLECTING the dust from swing-frame grinders without restricting the movement of the equipment is a problem which has long confronted foundries. However, an equipment which does not present interference of this nature has been developed by engineers of the Hunt-Spiller Mfg. Corp., Boston.

The accompanying illustration shows a grinder equipped with the new dust removal apparatus which through a number of features retains the ease of handling of the machine. A revolving bonnet has been placed on top of the cyclone arrester, as shown at the left, so that the entire device is permitted to swing with the crane supporting the grinder. A flexible steel pipe permits oscillation of the grinder.

A swivel bonnet, to which the draft pipe is connected, surrounds the driveshaft to permit longitudinal rotation of the frame of the grinder. Sparks and dust from the wheel pass through the open throat of the collector and are interrupted by a flexible damper which is sufficient to retard their velocity and to permit all but the heavier particles to be carried up into the equipment by the suction from the dust arrester unit, which is located outside of the building and to which the entire device is connected.

Experience has shown that the connection at the top of safety hood which surrounds the wheel is of considerable advantage in picking up dust carried into the hood by the rotation of the wheel.

In connection with its good housekeeping program, the Hunt-Spiller company also employs a portable vacuum cleaner of the industrial type to prevent the accumulation of dust and dirt in its powdered coal plant and other departments of the foundry. The electrically-driven unit is used to clean off the walls, the tops of bins, the runways of buildings and other places rather difficult to reach. The walls of the building have been painted white.



A REVOLVING bonnet on the cyclone arrester, and flexible steel connecting pipe permits freedom of operation of this swing-frame grinder. The connection at the top of the safety hood is of considerable utility

Develops Formula for Heat Loss Calculation

Calculation of heat losses through furnace walls is illustrated by R. H. Heilman, Mellon Institute of Industrial Research, Pittsburgh, in the February bulletin, No. 47, of the American Refractories institute. A formula is developed for this calculation, considering only the heat transfer by conduction through the wall under steady conditions, no attention being given to the effects of infiltration, furnace pressure, open joints and the like.

Mr. Heilman points out that the quantity of heat transmitted by conduction through the furnace wall per unit area varies directly with the temperature difference between the outer and inner surfaces of the wall, the thermal conductivity of the refractory and insulation, and inversely with the thickness of the same.

Surveys Control of Research Projects in 45 Plants

Industrial research has been a major contributing factor in reducing the cost of production and in developing business through new or improved products, or through new uses for old products. If properly directed and controlled it is recognized as a sound investment for an industrial organization, according to a new report of the policyholders service bureau, Metropolitan Life Insurance Co., 1 Madison avenue, New York.

Forty-five prominent manufactur-

ADVERTISING PAGES REMOVED

ing organizations contributed data contained in this report, which is entitled *The Control of Industrial Research.* The material deals with the organization and administration of an industrial research department.

Aluminum Paint Made To Spread More Easily

A ready mixed aluminum paint claimed to have better spreading properties and therefore giving more thorough coverage and more complete protection, has been developed by Aluminum Industries Inc., 2438 Beekman avenue, Cincinnati. The new product is made possible by commercial application of a method for exploding the powder lumps which form during the processing of the paint. The method, which requires the use of high vacuum cylinders, has been confined heretofore strictly to laboratory practice.

When aluminum bronze powder is mixed wtih the vehicle by hand, the particles tend to group together in clusters having from 4 to 50 particles per lump. These lumps, practically dry on the inside but wetted on the outside, cannot be broken up by ordinary mixing methods. By applying a 31-inch vacuum to the paint, the air imprisoned within the lumps is released explosively.

Tests are said to have proved that aluminum paint exploded by this process spreads more easily and keeps a uniform brilliance because there are no lumps present to roughen the surface. The paint is offered under the tradename Permite.

Standard Iron and Steel Treatise Is Revised

The Metallurgy of Iron and Steel, by Bradley Stoughton; cloth, 559 pages, 5¾ x 9 inches; published by the McGraw-Hill Book Co., New York; supplied by STEEL, Cleveland, for $4.00, plus 15 cents postage; in Europe by the Penton Publishing Co. Ltd., Caxton House, Westminster, London.

The fourth edition of this work, published first in 1908, consists almost entirely of new material. This has been done to bring all the material up to date, and at the same time provide a rearrangement of all the text matter. One of the objects of the rearrangement has been to present the subject largely from the historical standpoint.

The work opens with a general introduction to the early history of the iron and steel industry, including a discussion of later developments in ore smelting, and reference to the first application of chemical theory in ferrous metallurgy. Under the heading of "The Age of Steel," the author gives a summary of iron and steel manufacture. Melting processes and practices are introduced and discussed under "Iron Ore Smelting in the Twentieth Century"; "Modern Open-Hearth Practice"; "The Bessemer Process"; and "Electric Processes for Producing High Temperatures."

Various phases of the manufacture of iron and steel products then are discussed. The rolling mill is treated under the heading of "The Ingot Making Stage of Manufacture" and forging, pressed metal, wire drawing and other mechanical methods of fabrication are discussed in "Mechanical Treatment of Steel." A substantial portion of the latter part of the book is devoted to problems of interest to the foundry industry.

German Research Reports Issued

By Prof. W. Trinks

A WIDE range of subjects was covered in 1933 by the Kaiser Wilhelm Institute for Research in Iron and Steel, Germany, judging by the 22 bulletins which constitute Vol. 15 of its proceedings. The publication contains 314 pages, 444 illustrations and 121 tables, and represents the accomplishment of an enormous amount of work. Either the complete volume or individual bulletins can be purchased. The text is, of course, in German.

The variety of work covered is so great that only titles of the bulletins can be mentioned. These are as follows:

(1) Experiments on the Pressure Distribution in the Region of Contact in a Rolling Mill; (2) Influence of Manganese on Hardening Ability of Carbon Steels: (3) Contributions to the Acoustic Investigation of Steel Bars—More Particularly for the Production of Chimes; (4) Calorimetric Investigations on Tempering of Hardened Carbon Steel; (5a) Desulphurization in High-Frequency Furnaces; (5b) Design and Operation of Vacuum High-Frequency Furnace; (6) On the Precise Determination of Lattice Constants by the Reflection Method; (7) On the Mechanical Properties of Alloy Cast Iron and a New Method for Evaluation of Bending Investigations; (8a) Tests in Rolling Carbon Steels and Silicon Steels at Medium Temperatures; (8b) Effect of Friction in Rolling Strip Steel; (9) On the Influence of Annealing Temperature on Drawing Qualities of Steel Wire; (10) A Fatigue Test with a Tension and Compression Machine at High Frequency; (11a) On the Distortion of Lattice Structure During Cold Flow and Its Restoration During Crystal Recovery and Recrystallization; (11b) On Variations of the Lattice Parameter of Alpha Iron During Absorption of Hydrogen; (12a) Experimental Investigation of Magnetic Roasting of Iron-Oxide Ore by Means of Iron Carbonate; (12b) Measurement of Electrical Resistance for Determining Kinetics of Transformation of Austenite; (14) On the Kinetics of Transformation of Austenite—Magnetic Experiment on Self-Hardening Steel; (15) On the Reaction Between Commercial Types of Pig Iron and Their Slag; (16) On the Preparation of Olithic and Pebble-Like Iron Ore; (17) On Aging of Steel Sheets; (18) Experiments on Steel Bars with Variable Tensile Stress; (19) Application of Potentiometric Analysis in Steel Work Laboratories—Determination of Sulphur in Iron, Steel, Ferroalloys, Slags and Ores; (20) On the Kinetics of Transformation of Austenite—Magnetic Experiments on Carbon Steel Bars; (21a) Reaction Between Carbon-Free Liquid Iron and Iron-Manganese Oxide Silicates which are Saturated with Silica; (21b) Equilibrium of Deoxidation of Liquid Iron with Manganese and Silicon; (22) Additional Experiments on Physical Phenomena in the Thomas Process.

The work is meritorious throughout; it contains items of great interest to metallurgists, chemists, physicists and mechanical engineers. Some of the results are truly outstanding.

YES, WE'LL HAVE PLENTY OF BANANAS ON THESE STEEL BARGES: Six of 27 all-welded steel barges for the transportation of bananas in shallow waters, constructed by the Equitable Equipment Co. Inc., New Orleans, for shipment to Central America. Length is 60 feet, width 20 feet, hulls and decks are fabricated of ⅛-inch steel plates. Total depth of each barge is 3 feet, draft is 6 inches. Machines and electrodes for the welding work were supplied by General Electric Co., Schenectady, N. Y.

PROGRESS IN STEELMAKING

RIBBED rather than a corrugated effect is a recent improvement in the appearance of steel sheet siding. The product is formed with ribs 2½ inches wide, the indentations being ½-inch deep. Fencing of this type was used to enclose the grounds at the Century of Progress, Chicago.

♦ ♦ ♦

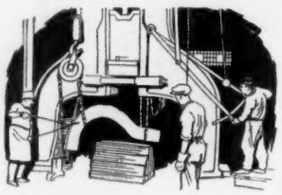
Lime streaks on wire regardless of how far it is drawn is prevented at a plant in this country by the use of cold lime agitated in the tub by steam. Hot thin lime frequently results in the die scratching the wire during reduction whereas a heavy coating of cold lime prevents this action and at the same time affords a similar finish.

♦ ♦ ♦

Hard facing ring dies, which are used in the production of seamless steel cylinders or high-pressure gas tanks and are subjected to severe heat and abrasive action, affords increased life according to the practice of a Pennsylvania pipemaker. Approximately 30 to 40 cylinders formerly were secured from the dies. Hard facing the dies used in the last stage of the finishing bench gave from 200 to 825 cylinders before rebuilding was necessary. In the first two stages hard faced dies yield about 2000 tanks.

♦ ♦ ♦

Some coke oven operators through periods of economic depression have found it advisable to cool down ovens instead of keeping them warm where the period of enforced idleness is calculated to run more than six to seven months. Others, however, believe the time it pays to keep a coke oven warm may be as long as two years and possibly as long as five years. Many coke oven plants cooled down through 1932 and early 1933, have resumed operations since the late spring of 1933 and it has been found that even though ovens in some cases had been cooled down for periods longer than seven months, upon resumption underfiring is normal and there has been no loss in by-product recovery and time of coking heats has not been changed. Buckstay expansion, due to cooling and reheating, has been proved inconsequential. General opinion concurs cooling down as advisable only when ovens previously are in good condition.



PRODUCTION of forgings in one impression is the purpose of a newly developed automatic forging press. The unit, which operates at 900 tons pressure, 70 strokes a minute and in conjunction with a furnace, is designed for high production. The life of the dies is from 20,000 to 25,000 pieces per die per sinking.

♦ ♦ ♦

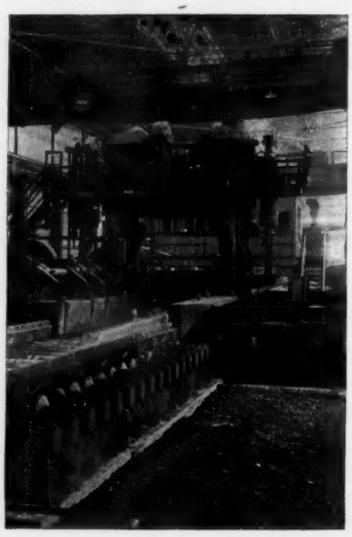
In excess of 90 per cent of the ultimate strength of wire rope is developed by a wedge-type socket recently marketed by an eastern wiremaker. The fixture is designed to prevent damage to wire ropes through excessive pressure on the pulling rope at the upper end of the socket basket, this being accomplished by providing machined bearing surfaces on both the wedge and socket.

♦ ♦ ♦

Draft, pressure and differential draft or pressure now can be gaged in ranges between 1/10-inch water and 100 inches water by the development of a new compact electric contact unit. The new gage is adaptable to the applications where it is desired to sound an alarm or light a bulls-eye when certain pressures reaching a predetermined high or low point, as in drying, ventilating, dust collecting and similar systems. When used in conjunction with intermediate devices the instrument may be employed to open and close dampers, start and stop fan for vibrating motors, etc.

♦ ♦ ♦

Installing an upwardly expanding section above the stockline of a blast furnace greatly reduces the amount of flue dust blown over into the dust catcher, according to a blast furnace engineer. At a stack where this top construction was followed, it was found that the increase in the cross-sectional area at the gas uptakes resulted in lowering the velocity of the gas the flared section also effected a more uniform distribution of the fine and coarse ore going through the stack. As a result of these two refinements the quantity of flue dust carried out of the furnace by the gas has been greatly reduced.



A CONTINUOUS MILL 2100 FEET LONG

Illinois Steel Company's new 96" Continuous Plate Mill represents the last word in the control of rolling operations to assure a high degree of accuracy in size and finish.

The mill is more than a third of a mile long—from soaking pits to the last of the nine stands of rolls. Yet so precise is the control that rolling speeds of 700 feet per minute can be attained.

The mill has a capacity for plates up to a width of 84 inches, a length of 140 feet, and in thicknesses from one-eighth inch up.

Illinois Steel Company
SUBSIDIARY OF UNITED STATES STEEL CORPORATION
208 South La Salle Street, Chicago, Illinois

U.S. STEEL

ILLINOIS PLATES

Multizone Gas Washer Serves As Scrubber and Drier

WET washing of blast furnace gas is effected by contact and impact of the dust particles on wetted surfaces. The required contact and impact can be obtained by exposing greatly extended wetted surfaces completely. If minutely divided water drops, which present maximum contact surfaces, are driven into the gas stream, the permanent entrapment of the dust particles upon the scrubbing surfaces of the washer is greatly facilitated, particularly if these scrubbing surfaces are of materials which have a high surface affinity for water, such as wood and rubber.

The foregoing principles have been incorporated in a new static gas washer of the multizone type by the Freyn Engineering Co., Chicago. In the first zone of the washer, the gas enters tangentially near the bottom, as shown in the accompanying illustration. The heavier dust particles are thrown centrifugally against the shell where they are entrapped in a water film thereon, and carried to the collector cone at the bottom of the washer. This film of water is caused to flow over the shell from the distributor box below the hurdles. As the lighter particles of dust do not have sufficient centrifugal force to traverse the comparatively large distance from the interior of the spiraling gas stream to the wetted shell wall, only the heavier particles are removed in this first zone.

Involves System of Grillage

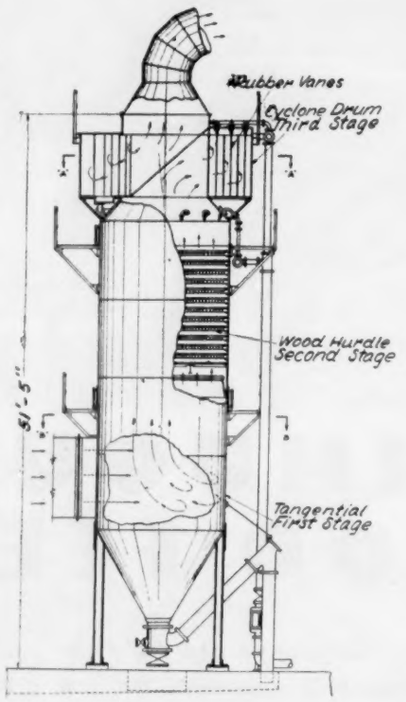
In the second zone, the gas passes through wetted wooden hurdles. High turbulence is induced by staggering the vertical alignment of the hurdle slats; by leaving free spaces across the washer horizontally between successive courses of hurdles; and by causing the gas to flow through the hurdle openings at a velocity exceeding the critical velocity which causes the gas stream to roll and acquire turbulence. The free spaces between the successive hurdle courses also distribute the gas flow evenly over the horizontal area of the washer and prevent channeling.

The third zone of the washer removes 85 to 90 per cent of the dust remaining after the first two stages. This dust consists chiefly of fine particles of such buoyancy that they avoid surface contact in the hurdle stage.

In the third zone, the gas enters an annular drum, the central portion of which is divided diagonally by a metal plate or diaphragm. The gas enters through a port on the inner vertical wall of the drum under the diaphragm, and divides left and right. The two portions of gas pass symmetrically 180 degrees through the drum, rejoin, and pass out of the drum through a port in the inner vertical drum wall, similar to the entry port but above the diaphragm, and thence to the washer exit.

Passages Are Concentric

Within the annular drum and substantially parallel to its vertical walls, are a number of vertical rubber vanes, spaced so as to form comparatively narrow concentric passages for the gas. The curvature of these vanes is on an ever-decreasing radius, so that the centrifugal effect upon the dust in the gas is of ever-increasing intensity. It is an integrated cyclone effect. The dust tends to travel tangentially to the curvature of the passages. However, the more buoyant particles are strongly influenced to follow also the circular flow of the gas stream.



Three-stage washer for cleaning blast furnace gas

The resultant of these two effects is that even the lightest particle changes its location in the gas stream in an outward, or radial, direction. The passages being narrow, the dust particles need to change their location only a few inches before coming in contact with a wet rubber surface. The rubber surfaces are wet because the gas entering the cyclone drum contains, intentionally, a large amount of entrained water, and the particles of water act the same as the particles of dust in moving toward and making contact with the rubber vanes.

Dust and water thus are precipitated upon the wet rubber surfaces and flow to the sump at the bottom of the drum. For the primary cleaning of blast furnace gas to a specified maximum dust content of 0.15-grain per cubic foot, the vanes are spaced an average distance of 7 inches. A velocity of 37 feet per second will be accompanied by a pressure drop of ½-inch through the cyclone drum. Once in contact with these wet surfaces, the dust particles and the entrained water drops are removed definitely and permanently from the gas stream. This third zone cyclone drum thus is effective as a cleaner and as a drier.

A washer of this type, 12 feet diameter and 51 feet high, is rated at 80,000 cubic feet per minute of gas at standard conditions. Using water at a rate less than 18 gallons per 1000 cubic feet of gas cleaned, and requiring a water pressure of only 30 pounds per square inch, the washer will clean blast furnace gas to 0.15-grain of dust per cubic foot —a point at which the combined cost of primary and fine cleaning is a minimum, should this washer be used in connection with secondary cleaning. The pressure drop through the washer is less than 6 inches of water. The gas contains under 1 grain of entrained moisture and is well suited to use in stoves with 3-inch or larger checker openings, and in many boiler plants.

Rails Cooled by Retarded Process

A NEW process for cooling steel rails is understood to have been perfected by a member of the metallurgical department of the Dominion Iron & Steel Co., Sydney, Nova Scotia, Canada, and recently applied to the cooling of a 80,000-ton order of rails for the Canadian National railway, according to a report by Consul Frank Bohr, Saulte Saint Marie, made public by the department of commerce, Washington.

The process, it is believed, is not used in rail mills in the United States although similar retarded cooling methods have been used in connection with other steel products, the report states.

The new process is intended to prevent the so-called shatter cracks, particularly in the head of the rail, which are said to be caused by the

more rapid cooling stresses in the steel and which in service are apt to develop into transverse or longitudinal fissures and ultimately cause breakage of the rail head.

It is contended that such cracks develop, not while the rails are still red hot, but rather in a later stage of cooling described as the black stage when a retarded cooling is said to be possible without danger of softening the steel.

Instead of placing the rails parallel on the hot beds or racks and allowing them to cool completely by exposure to air, the new cooling process as applied at the Saulte Saint Marie plant provides that when their temperature has thus been reduced to about 750 degrees Fahr. they are rapidly transferred by means of magnetized traveling conveyors to the specially constructed cooling tanks where they are allowed to remain until a temperature of about 100 degrees Fahr. is reached.

Cooling of the rails is retarded so that while ordinarily requiring only approximately 6 hours when exposed to the action of the open air in the plant, about 72 hours are required when cooled in the tanks.

The tanks, constructed of heavy sheet steel, are about 40 feet long, 5 feet wide and 10 feet deep. The sides are braced on the outside and the bottom and inside walls are sealed so as to be more or less air tight. A close-fitting lid of sheet steel prevents escape of the heat at the top.

The rails are stacked in parallel tiers which are separated by small iron bars. The number of rails as well as of tiers placed in each tank depends upon their weight and temperature and the general temperature conditions of the plant as a whole. No artificial means of cooling the rails in the tanks is used. From the tanks the rails are sent to the straightening department of the plant.

Plants at Sydney and Saulte Saint Marie are the only two which have so far placed the new cooling process in operation, according to the consul.

Gear Makers To Meet

The annual meeting of the American Gear Manufacturers association will be held in the Penn-Lincoln hotel, Wilkinsburg, Pa., May 3-4, according to an announcement made by J. C. McQuiston, secretary. The association maintains its headquarters in this hotel.

PROGRESS IN MANUFACTURE AND USE OF WIRE AND WIRE PRODUCTS

BY F. H. NULLMEYER
Youngstown Sheet & Tube Co.

IN THE drawing of wire the metal is reduced by a die, through which the rod is pulled by the drawing block, previously described. Dies usually consist of rectangular plates, or slabs, of various widths thicknesses and analyses. Until recently, almost all dies were made of chilled cast iron or of semi-tool steel. The ones made of steel are called plates, while the slabs are cast iron dies with conical holes extending just through the casting.

The holes at the little end of the conical-shaped openings are so small that they hardly can be seen. They are formed by reaming with a square piece of hardened tool steel, having a long slender taper. The portion of the hole through which the wire passes last is finished straight and cylindrical, to the exact size required. This is known as the bearing.

Usually the steel plates are purchased with the tapered holes already punched three-quarters of the way through. This is known to the trade as three-fourths pricked. The balance is punched or drilled through at the wire mill by a workman known as a plate setter. Steel plates are especially useful for drawing wire because, after the holes wear too large, they can be reduced in size by peening around the hole, partly closing it, and then driving a sizing punch through it, bringing it to the same starting size as before. This, of course, cannot be done with cast-iron dies. When the holes in them become over-size, the only remedy is to ream them to the next larger size, and so on until worn out.

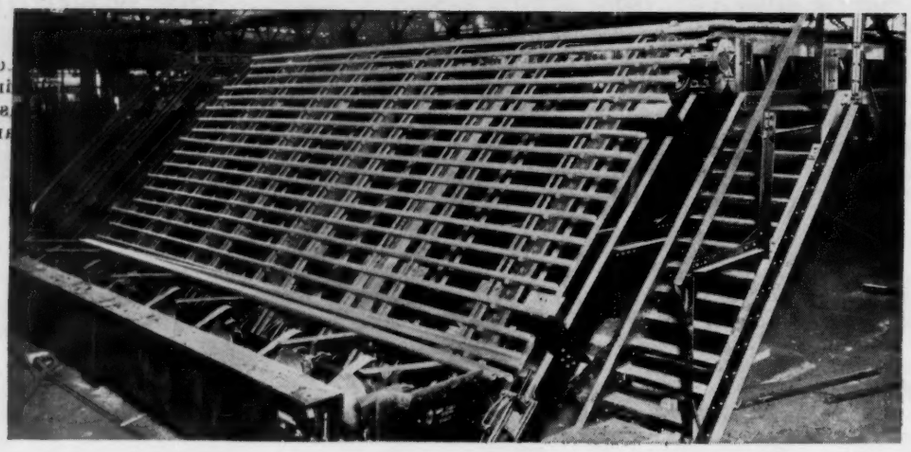
Steel plates and cast-iron dies, as described, are generally used for wire in gages coarser than No. 18 or No. 20. For finer gages of wire, whortles, or diamond dies, are used. A whortle is merely a small tool steel plate. Diamond dies usually consist of black bortz, or the yellow variety, set in the center of a brass or other metal disk.

Steel plates, cast-iron slabs, whortles and diamond dies, though in use in many mills, are rapidly being re-

Finishing tungsten carbide dies. The die revolves at high speed in a small jeweler's lathe, is given the right contour and polished with diamond powder.

REX CHAIN

FOR EVERY DRIVE & CONVEYOR



STEEL MILL CHAINS THAT WEAR LONGER

REX Transfer and Cooling Rack Chains

Rex Chabelco Chains retain their accuracy of pitch and maintain the attachments in proper alignment even under unusually severe operation on transfer and cooling racks. Here again, careful manufacture and the unit link principle make Rex Chabelco Chains wear much longer.

REX Catching and Feeding Table Chains

Rex Catching and Feeding Table Chains are made in both alloy steel and Z-Metal. Rex Alloy steel chain No. 587, commonly used for this service, is an all-steel roller chain which operates on 88 sprockets. This chain maintains its accuracy due to the unit link principle by which the carefully machined parts of this chain are assembled. It stands the wear of running at relatively high speeds with reversals in direction of from 30 to 40 times per minute. Rex Z-Metal Chains are also used for this work.

To secure maximum wear with these chains on catching and feeding tables, we recommend Rex Alloy Temperim Sprockets with anti back lash teeth.

Other REX Chains

Rex Roller Chain—The most highly finished steel chain for high speed drives. Available in standard sizes in single or multiple strands. Rex Roller Chains meet the requirements for practically any high speed plant or duplicate machinery.

Rex Z-Metal Chain—Rex Z-Metal Chain is 30% stronger than malleable and is cast in the same numbers. It shows greater resistance to corrosion, abrasion and pounding. It is widely used in plants and machine assemblies. Rex Z-Metal is frequently the solution to malleable chain difficulties.

Chain Belt Company also makes a complete line of other standard sprocket chains for every type of use—as well as a line of special chains. Write on the types that interest you.

CHAIN BELT COMPANY
1660 W. Bruce St., Milwaukee, Wis.

CHAIN BELT COMPANY

CHAIN & BELT CONVEYING

placed by dies of tungsten carbide, an alloy approaching the hardness of a diamond.

The initial cost of tungsten carbide dies is much higher than that of those formerly used, but the final cost is less because of longer life and endurance. They eliminate the labor required for reaming cast-iron dies, or setting and battering steel plates. Because the tungsten carbide dies wear over-size so much more slowly, it takes only one man to polish or size these dies as compared to 5, 6 or even 12 on cast-iron dies or steel plates.

One interesting fact in connection with length of life of the die is that it is footage, and not tonnage, which is the measure of its wear. In short, it is the outside surface of the wire in contact with the hole which has the abrasive action. Thus 100 pounds of ¼-inch wire amounts to 600 feet, while 100 pounds of ⅛-inch wire, only half the size of the ¼-inch, has four times the footage—2400 feet—and therefore four times the wear on the die.

Easy to Rough Out

Roughing out or enlarging holes in tungsten carbide dies is a comparatively simple matter, as there are several machines which will do this very quickly, and require little attention other than the feeding of carborundum to the die and roughing tool.

After roughing out the hole, the die is polished by the use of fine diamond powder on a needle, small wooden stick, or string. The die revolves in a small jeweler's lathe at high speed and the needle, stick or string oscillates in and out, back and forth, in the hole of the die, until the proper contour is attained and the surface given a mirror-like polish.

A quantity of rods ready for drawing is delivered to the wire drawer loaded upon a reel or flipper.

In order to start drawing, the wire drawer must first form a point on the end of the rod. This may be done by hammering, filing, swaging in a swaging machine, or by the use of a roll pointer. In any case, a point must be formed on the end of the rod long enough and small enough to pass through the die sufficiently far so that a tong, or a puller, can grip the point.

With the old-style bench equipment, numerous devices were used to pull enough wire through the die to reach the wire block and be clamped to it. These were called pull-in devices.

One consisted of an eccentric placed just under the block, which would permit sufficient oscillation of a bar in contact with the eccentric to pull a few inches of wire out and through the die. This bar was pivoted at the rear of the bench. The center of the bar came in contact with the eccentric, and the free end of the bar, at the front end of the bench, had a puller tong attached to it.

Another device was a reciprocating bar, running the full length of the bench, to which a puller tong could be attached at each die holder.

Still another was a sprocket chain running continuously the full length of the bench, propelled by sprocket wheels located at each end, with one strand of chain running at about the level of the top of the bench and the returning strand below it. The direction of travel of the upper strand was from left to right as one faced the bench.

By this arrangement considerable time was saved over older methods of pulling, as greater lengths of wire could be pulled through the die at one time, instead of but a few inches pulled in several grabs. After the tongs were attached to the pointed end of the rod projecting through the die, a hook on the tongs was slipped into one of the links of the sprocket chain. Thus the tongs would travel at the speed of the chain, as far as the sprocket at the end of the bench, if necessary, pulling the wire after them.

By one of these earlier methods, enough wire had to be pulled to reach the block and be clamped in a vise attached to it. This consumed some time and produced some scrap, as the puller tongs often mutilated the surface of the wire, especially by the oscillating bar or reciprocating bar methods. Sometimes the wire would break on account of the sudden jerk to which it was subjected, and this would require repointing the rod and repeating the operation.

This article concludes a series of four on the manufacture and use of wire and wire products, written by Mr. Nullmeyer, who is superintendent of the rod wire and conduit department, Youngstown Sheet & Tube Co., Youngstown, O. The first, on early developments in wire drawing, appeared in the March 12 issue; the second, on rod mill design and practice, appeared in March 19 issue; the third, in the March 26 issue, discussed recent trends in methods and equipment for wire drawing.

THE EDITORS

New System Is Devised

With the present individual motor-driven block method, a chain is used which reaches from the block to the die. A puller is attached to the free end of the chain. The other end of the chain is fastened to the block or to a coil spring within the block. After a few wraps of wire upon the block, the spring pulls the slack in the chain inside the top of the block. The slow and gradually accelerating pull with the motor-driven block prevents breakage of the point, and reduces the amount of scrap produced, as only the point itself need be trimmed from the finished bundle of wire.

It is necessary that a lubricant be supplied on the inner side of the die. The steel in the process of being drawn picks up a portion of this lubricant and carries it through the die. This is essential, as otherwise the wire will scratch the die, or the die will rapidly wear large and run oversize. The lime put on the rods in the cleaning houses answers to some extent for this purpose, but additional lubricants are needed.

Lubricants used today for this purpose vary, depending upon the kind of stock drawn and the finish which it is desired to produce. Among them are powdered soap, a soft grease rich with tallow, lime and grease mixed to a stiff paste, lime and grease reduced to a dry powdery condition, stearate of aluminum and lime, sawdust and oil, and various combinations of soft soap with one or more of the above substances. This process is classed as dry wire drawing.

A somewhat different process, known as wet wire drawing, is used chiefly for the manufacture of finer gages of wire. The material to be drawn in this case usually consists not of rods, but of wire itself which is being reduced to a still smaller size.

Plated for Wet Drawing

Under the wet drawing process, the wire, before final drawing, is plated with a coating of copper or copper and tin, producing a bronze or brass-colored finish. After plating, the wire is dipped into a solution of soap and water and then placed on a reel inside a tub or vat containing a solution of flour and water which has been prepared for some time and allowed to ferment.

Drawing is then done in the usual way, with the reel, containing the plated wire to be reduced, revolving in the above solution and the plated wire kept wet until it reaches the die. A small quantity of tallow is generally put on the wire before placing it in this solution, as some of the tallow will be carried to the die and act as an additional lubricant in drawing.

Practically all steel wire in the finer sizes, from about No. 20 gage on down, is drawn wet. This is because copper and tin, being softer than steel, prevent the severe wear on the die which would result if pure steel were pulled through the die at the rate of as many feet per pound as is required in the finer gages. Some large sized wire is finished in the same manner, but this is more

for ornamental purposes than for any other reason.

The drawing of wire increases its tensile strength and elastic limit. Therefore, in the case of sizes which require a number of drafts, the wire must be annealed after a few drafts to soften the metal. Grade of stock, size of wire, and number of drafts determine frequency of annealing necessary.

A high temperature heat treatment, known as patenting, is used on wire stocks of high carbon content, such as rope wire, bead wire, music wire, needle wire, spring wire, and the like. This treatment, properly co-ordinated with drafting, results in wire of high tensile strength and good torsion and bending test. Normalizing is another high temperature heat treatment used for produucing extreme softness in wire of higher carbon content, such as wire used for bolts which are cold upset or headed.

Normalizing differs from patenting in that under the normalizing process stock is heated to a temperature above the upper critical range, held at this temperature for a period of time, and then allowed to cool in the air; whereas under the patenting process stock is heated to an upper critical range and then quenched rapidly in air, lead or salt, to give it the proper grain or structure.

Scale Removal Necessary

After annealing, patenting or normalizing, stock must be recleaned, like rods, in order to remove the scale, if it is intended to be drawn down to smaller sizes.

Bright annealing can be accomplished by annealing in certain salts, such as barium chloride; or by placing the coils of wire in sealed steel pots from which all air is excluded, heating to required temperatures, and cooling slowly before removing from the pot.

The tendency to produce wire in heavier bundles is leading users of wire likewise to equip themselves with devices for lifting bundles of heavier weight. Increased size of bundles adds to efficiency of fabricating, as machinery may run longer without stopping for splicing, or for removing the last end of a bundle which may be too short to form a final piece of the product being made upon the machine. Therefore scrap loss with heavier bundles is less.

Metal Protective Coatings Withstand Corrosion

Protective coatings for metals, developed by L. Sonneborn Sons Inc., 88 Lexington avenue, New York, are claimed to withstand most severe conditions such as exposure to sulphuric acid, hydrochloric acid, ammonium hydroxide, strong alkalies, hydrogen sulphide, and salt water. The paint coatings, which extensive tests have shown may be applied over rusted surface without preliminary preparation, prevent further corrosion and disintegration.

According to the manufacturer, the effectiveness of the S.R.P. coatings, as they are designated, is attributed to the impermeability of the film because of the absence of microscopic pores, and the dense continuous coating formed through blending of the completely oxidized, inert, and chemically stable natural element with special vehicles.

Lessons in Arc Welding; Course for Practical Man

Lessons in Arc Welding; published by Lincoln Electric Co., Cleveland; supplied by STEEL, Cleveland, for 50 cents, plus 15 cents for postage: in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

In a series of 28 lessons in arc welding presented in 60 mimeographed pages is presented the course of instruction given in the Lincoln plant by Arthur Madson. The lessons are practical rather than theoretical, the result of the lecturer's experience in teaching a large number of men to become practical arc welding operators.

Illustrations consist of drawings interspersed in the text to bring ocular evidence in support of the text.

How Britain Is Reorganizing Steel

(*Continued from Page* 14)

iron and steel for a period of two years. The question of the continuance of these duties will, therefore, have to be considered by October this year.

The scheme was duly prepared by the National Committee for "the establishment of machinery whereby reorganization of the industry may be carried out rather than the scheme of reorganization itself." This scheme was purposely drawn on broad lines and with an elastic structure, so as to be readily adaptable to the constantly-changing conditions of trade and industry.

It was on a report elaborating this scheme that the members of the National Federation of Iron and Steel Manufacturers were asked to vote on Feb. 22. By its resolution, the meeting approved the principle embodied in the National Committee's scheme, but deferred a vote on the scheme itself until April 19, when a second special meeting will be called. The resolution stated:

That this general meeting of the members of the National Federation of Iron and Steel Manufacturers, having considered the draft constitution for the central organization of the industry, dated Nov. 17, 1933, which was adopted by the national committee on Dec. 21 last and circulated to all members on Jan. 4, 1934, approves in general terms of the scheme for the revised constitution of the federation as therein set forth, and directs:

That a committee be appointed, representative of the federation and the commercial associations, from this meeting to prepare the final draft constitution in general accordance therewith, but giving effect to amendments suggested by counsel, and taking into consideration suggestions or amendments which have already been received or may arise as the result of subsequent discussion at this meeting, or which may be received from any member by the secretary of the federation in writing on or before March 8 next.

This meeting further directs that such final draft be submitted for acceptance or rejection to a special general meeting of the federation to be convened on April 19, and that a print of such final draft be sent to each member together with or before the notice convening such meeting.

Will Succeed Federation

It will be noted that this resolution calls for a revision of the constitution of the National Federation of Iron and Steel Manufacturers, for it is part of the scheme that a new body styled The Iron and Steel Corporation of Great Britain, and arising out of the existing National Federation, shall be the central body of the new organization.

The original scheme prepared by the National Committee, which sets out the general principles which should govern the reorganization, can be summarized as follows:

1. General Organization. The British iron and steel industry shall be organized on the basis of a number of approved Associations, each dealing with a group of similar products, and a central body co-ordinating Associations and incorporated either under Royal Charter or under the Companies' Act, called the Iron and Steel Corporation of Great Britain.

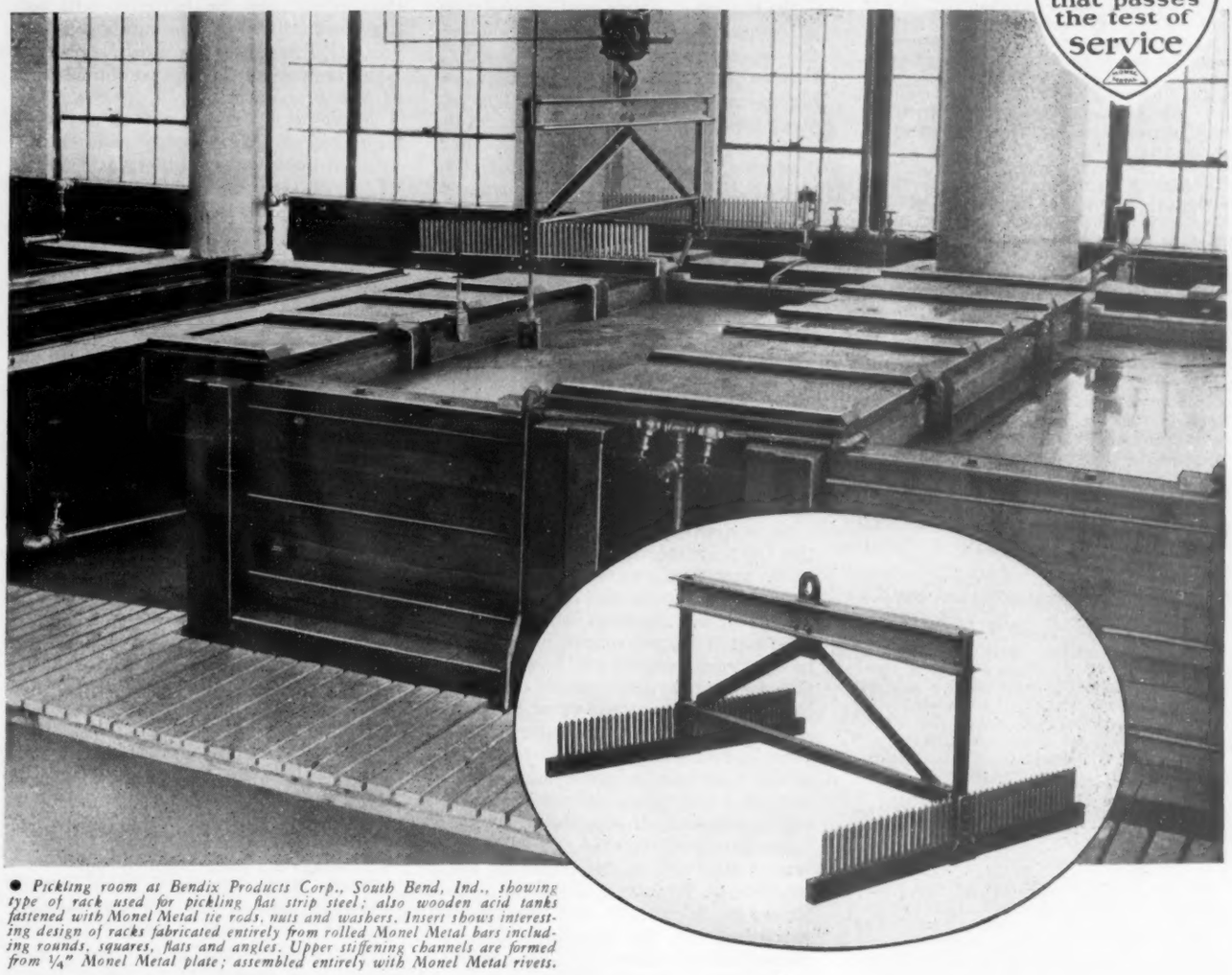
2. Membership. All producers of iron and steel in the United Kingdom, and all firms substantially engaged in the manufacture of iron and steel products, shall be entitled to become ordinary members of their appropriate Associations and of the Corporation. All members of the Corporation shall automatically become members of the Associations dealing with their respective products when constituted and approved.

3. Functions. The Corporation shall be empowered (a) to provide services of an advisory character for the assistance of its members and Associations; (b) to promote the formation of approved Associations and to exercise such measure of supervision over them in matters of general policy and matters affecting more than one Association as is necessary; (c) to provide for the approved Associa-

MONEL METAL PICKLING RACKS

stand hard use in Bendix Baths

No. 65
Pickling Equipment that passes the test of service



• *Pickling room at Bendix Products Corp., South Bend, Ind., showing type of rack used for pickling flat strip steel; also wooden acid tanks fastened with Monel Metal tie rods, nuts and washers. Insert shows interesting design of racks fabricated entirely from rolled Monel Metal bars including rounds, squares, flats and angles. Upper stiffening channels are formed from ¼" Monel Metal plate; assembled entirely with Monel Metal rivets.*

Sturdy, light-weight strip-holders fabricated entirely from rolled stock

Faced with the problem of pickling flat steel strips preliminary to cold rolling and forming operations, the Bendix Products Company turned to its own designing engineers . . . and Monel Metal . . . for a satisfactory answer.

The light-weight, yet strong, holders illustrated above show how the job was handled using nothing but rolled Monel Metal stock parts: rounds, squares, angles, flats, sheets and rivets.

Monel Metal combines the strength of steel with high resistance to chemical reaction with either acid or alkali materials commonly used for pickling. Not being subject to embrittlement by acid attack, it retains its full unit strength, even after many years of vigorous service.

Here's a challenge. Next time you have to replace a pickling crate, basket or rack, specify Monel Metal. Keep cases on that one item and compare its performance, its whole-life cost, and the quality of its work with equipment of *any other type.*

On such a basis we are content to have Monel Metal pickling equipment judged.

• • •

Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

MONEL METAL

MONEL METAL

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

G-2393R

tions services of general benefit to their members, such as central purchasing, common marketing, research, etc.; (d) to assist the Associations in the promotion of desirable amalgamations and extensions and improvement of plant, and in the prevention of unnecessary duplication of plant; (e) to co-operate with the Associations in promoting the export trade of iron and steel; (f) to adjust matters in dispute between Associations; (g) to act on behalf of the industry generally in all negotiations with outside interests, such as other industries, the government, parliament, foreign governments, foreign industries, etc.

4. Management of the Corporation. The Corporation shall operate through an Annual General Meeting, a Council, an Executive Committee and four Regional Committees, together with national Advisory Committees for Wages, Transport, Research and other matters as may be found necessary.

5. Annual General Meeting. Each year will be held an Annual General Meeting, which shall receive a report and statement of accounts.

6. Constitution of Council. The Council of the Corporation shall be constituted as follows: (a) a whole-time permanent chairman; (b) the chairman of the British Iron and Steel Export Association; (c) nine representatives of the four Regional Committees; (d) one member specially representative of each of the following ten sections of the industry: wrought iron; steel castings; re-rolled products; tinplates; wire; special steels; forgings; sheets; tubes; fabricated steelwork.

7. Meetings, etc., of Council. The Council shall meet at least once a quarter.

8. Executive Committee. The executive Committee will have eight members: The chairman of the Corporation, the chairman of the British Iron and Steel Export Association, the four chairmen of the Regional Committees, and two other members.

9. Regional Committees. A Regional Committee, representative of interests comprised in the Corporation, shall be constituted for each of the four regions, to be elected by members of the Corporation in the respective regions.

10. Functions of the Regional Committees. The Regional Committees shall exercise such powers and duties as may from time to time be delegated to them by the Council of the Corporation.

Members Are Taxed

11. Income of the Corporation. The income of the Corporation shall be derived in two ways: (a) by an annual levy per ton, payable by producers of pig iron and ingot steel; (b) by a levy on all members of the Corporation who do not produce pig iron or ingot steel not exceeding 5s per £100 wages paid per annum or by such other methods as may be approved.

12. Associations. A number of Associations will be formed or the existing Associations combined into the following: (1) Pig iron and ferro-alloys; (2) Blooms, slabs, billets, plates, angles, sections, joists, sheet and tin plate bars, rails and re-rolled products, such as rods, bars, hoop and strip; (3) Wrought iron in all forms; (4) Special steels in all forms; (5) Steel castings; (6) Forgings; (7) Sheets (8) Tinplates; (9) Tubes; (10) Wire; (11) Fabricated steelwork.

13. Constitution of Associations. The constitution of each of the above Associations shall, among others, contain provisions for preventing wasteful competition among its members, for securing the progressive concentration of production in the more efficient plants, for eliminating redundant and inefficient plants, for affording assistance to the export trade.

14. British Iron and Steel Export Association. All approved Associations shall be eligible for membership of a British Iron and Steel Export Association or Company, which is to be formed.

Whilst the above scheme deals mostly with the general principles of the reorganization of the industry, it is expected to provide for a quota scheme of production, the control of steel prices, a levy on home sales to assist exports, freedom of all export deiveries from any restriction by quota, the control of imports of foreign iron and steel, and, as mentioned under paragraph 14, the creation of an export company to be responsible for export sales.

Power to Fix Prices

It is to be noted that it is intended that the sectional Association shall be quite autonomous as regards the action they will exert on their own members, such questions as the fixing of prices of any products coming within the purview of each Association lying in their own hands.

It is also interesting to note that the Corporation or central body will have power to negotiate with foreign governments and foreign associations; and one of the ways in which it is hoped to control imports is by negotiating with foreign governments and associations in order to regulate the exchange of iron and steel products between their respective territories. It will be remembered that similar agreements were arrived at between Germany, France and Luxemburg in the years 1925-26.

As previously stated, at the meeting of members of the National Federation of Iron and Steel Manufacturers held on Feb. 22, the scheme presented to the meeting was referred for amendments to a committee of three, and a minority of members present at the meeting voted against the resolution; this minority was mainly composed of users of iron and steel, especially those who, for special reasons of their own, tend to favor the continuance of a Free Trade policy.

Even among this minority, a number of members are in favor of a scheme of reorganization, and it can be expected that when the amended scheme is put before the meeting on April 19, the majority in favor will be larger than on Feb. 22.

Among the dissentients are representatives of the steel industry to whom the idea of any possibility of compulsion on the part of a cental body is repugnant, but it will be noted that the general scheme proposed is elastic; and particularly as regards the amalgamation of existing firms and the closing down of uneconomic plant, the Corporation would be prepared to give its assistance, but would not take any measures to enforce such action.

As has been stated, a process of amalgamation already started in the iron and steel industry of Great Britain several years ago and entirely on the initiative of the firms concerned, and it is very likely that this process will continue to evolve and that eventually the industry will be practically divided into the four geographical groups, in accordance with what appears to be one of the ideals of the whole scheme.

There is a feeling among certain members of the industry that there is little hope of an ambitious scheme of reorganization being voluntarily accepted by the industry as a whole, and as the government has made it plain that the continuance of the duties on iron and steel depends on complete and effective reorganization of the industry, there would appear to be two alternatives if the scheme fails to be accepted.

On the one hand, the government might take measures to enforce such reorganization and to take a certain control of the industry; or, on the other hand, the industry may be left to put its own house in order, but until substantial results are obtained, there is the possibility that the duties may be taken off or reduced at the expiration of the present term in October next.

However, from responsible statements made by members of the government it would appear that the government has no desire to take any compulsory measures, and provided that a reasonable scheme is accepted by the industry and that steps are taken to put that scheme into effect, it is extremely unlikely that the duties will be removed; and it should be remembered in this connection that, originally, the duties were established not specially to protect the iron and steel industry of Great Britain, but as an emergency measure to protect the whole economic structure of the country at a time of acute crisis.

Duties Have Aided Trade

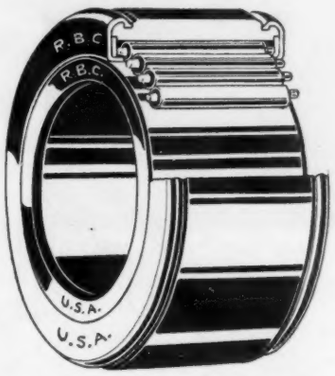
The effect of these duties so far has been favorable to British trade in reducing foreign imports and enabling the government to have bargaining powers, and it would appear that the protectionist policy of Great Britain will now be continued indefinitely; therefore, the members of the iron and steel industry have little fear of the duties being removed.

They are anxious, however, that the government should state definitely that these duties will be continued at their present level, as they claim that until they are assured of the continuance of the duties, they cannot very well take serious steps and bear the considerable expense which in some cases is the result of a comprehensive scheme of reorganization.

NEW EQUIPMENT

PRODUCTION FABRICATION
TREATMENT FINISHING

Antifriction Bearing—Roller Bearing Co. of America, Trenton, N. J., is introducing a solid roller self-contained bearing, shown herewith. Trunnion end type rollers are used, retained in the inner area of outer race by two cyanided roller retainer washers which are knurled over the ends of the outer race and maintained in a rigid and fixed position. Hard-



New bearing introduced by Roller Bearing Co. of America

ened steel plates are interposed between end rings and the ends of the rollers to serve the dual purpose of definitely locating the position of the rollers and to resist wear.

The new bearing is designed to operate on hardened and ground shafts. For shafts not adaptable to hardening the unit is used with an inner race made from SAE 52100 steel, hardened and ground. Design of the bearing minimizes churning of lubricant which is introduced into the unit through a hole in the outer race. Applications include speed reducers, cam rollers, pilot shafts, high-speed drill presses, universal joints, etc.

♦ ♦ ♦

Motors—Louis Allis Co., Milwaukee, is offering the addition of direct-current fan-cooled explosion-proof motors to its line. Quick and easy inspection of the commutator and brushes is made possible by three removable screw caps.

♦ ♦ ♦

Potentiometer Pyrometer—Bailey Meter Co., 1050 Ivanhoe road, Cleveland, has developed a new potentiometer pyrometer which employs the galvanometer electronic relay circuit to operate slide wire resistances and recording pens. One unit may include as many as four potentiometer circuits, the contact making galvanometer being automatically switched from one circuit to the next by relays actuated from contacts made by a synchronous motor-driven time device. One motor drives these timing contacts for the relay as well as the galvanometer contacting mechanism, the recording chart and the automatic standardizing relay contacts.

Because of the small current flow required to operate the electronic relay, it is possible to use light pressures on the galvanometer contacting mechanism without danger of burning. An outstanding feature of the unit is its continuous record or records, up to four in number, made on a circular recording chart. When more than one record is provided for, each is made in a different color ink so that it can be distinguished from the others on the chart, regardless of how many times they cross each other.

♦ ♦ ♦

Chain Hoist—Wright Mfg. division of American Chain Co. Inc., York, Pa., is announcing an improved model chain hoist. One innovation is zinc coating of all exposed parts, making the unit practical for outdoor use and for service in moist and other corrosive atmospheres. A system of continuous lubrication is provided. Additional minor improvements include hardened pawl tip, improved load chain guard, and ball spring covers on oil tubes.

♦ ♦ ♦

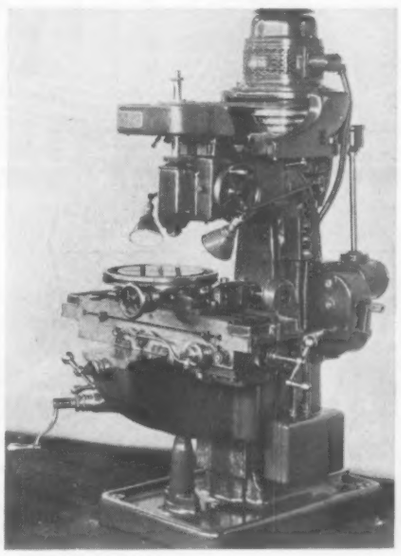
Recorder—Pyrometer Instrument Co., 103 Lafayette street, New York, recently announced equipment for testing welding or absorption glass. A pyro supersensitive radiation tube used in connection with a rapid recorder or an indicator will clearly record on a chart or indicate the percentage of transmission or quantity of infra-red rays in glass compared to the total energy of heat rays transmitted. The announcement brings out that the factor of injurious ultra-violet and infra-red rays from the standpoint of eyesight, are the most disturbing elements encountered in the use of welding glass.

♦ ♦ ♦

Reclosing Device—General Electric Co., Schenectady, N. Y., has developed a type SM direct-acting reclosing device for use with oil circuit breakers. This attachment will reclose a breaker one, two or three consecutive times, with equal time intervals between reclosures, when the breaker is tripped by overload. If the overload disappears after any reclosure, the attachment will return to its normal position and the breaker will remain closed. Should the overload still exist after the last reclosure, the breaker will remain locked open and it will be necessary to close it manually before any further automatic operation takes place.

♦ ♦ ♦

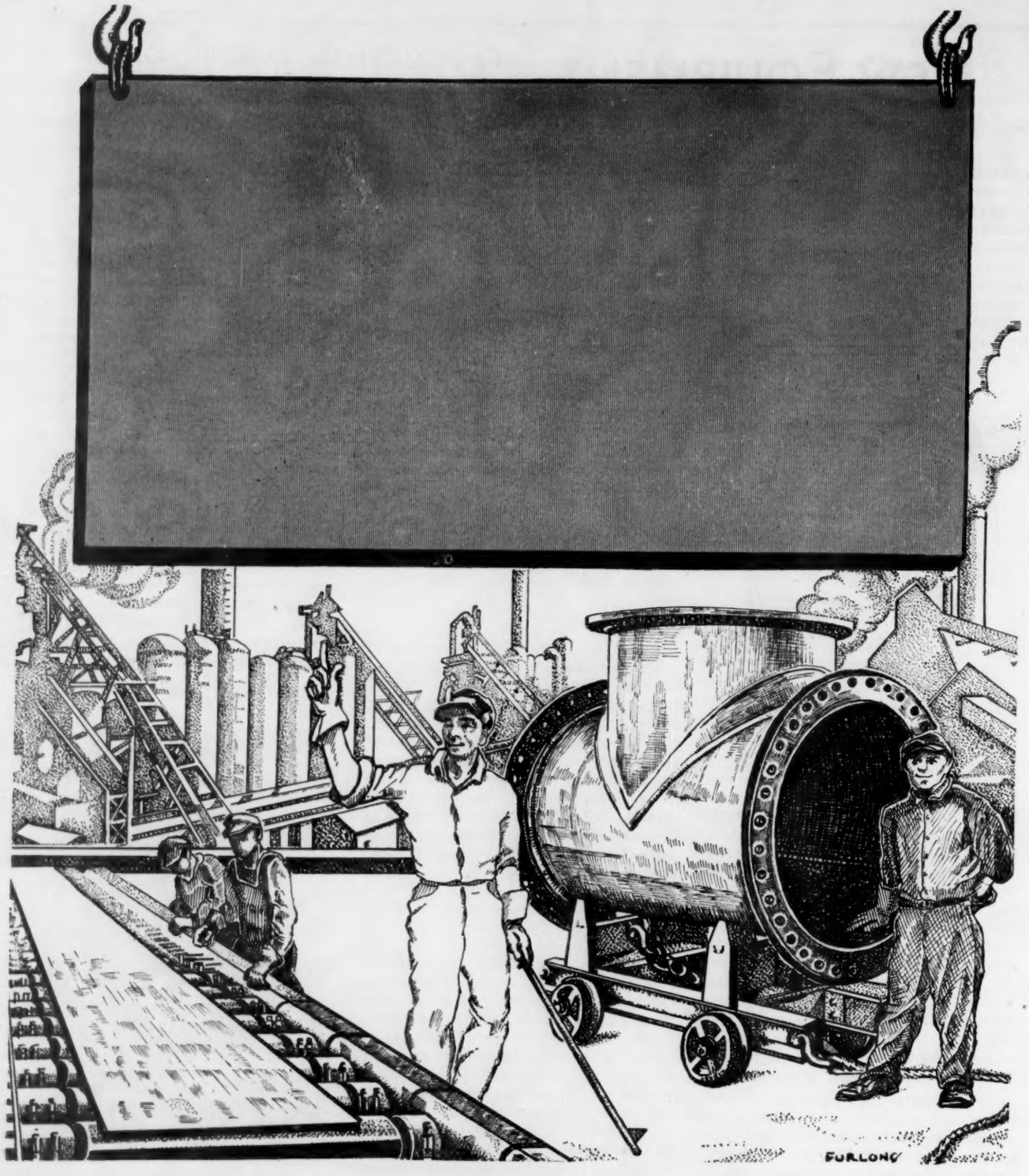
Vertical Milling, Die Sinking Unit—Reed-Prentice Corp., Worcester, Mass., is introducing a No. 3V vertical milling and die sinking machine, shown herewith. It is furnished with vertical motor drive like the smaller 2V model. A vertical type motor is carried in a bracket fitted to the slide of the column. This bracket is adjustable for proper belt tension and changes in spindle speeds through screws operated by a hand wheel. A binder handle quickly and securely locks the motor bracket in position. Drive is through an endless V-belt and 4-step spindle and



Reed-Prentice 3V vertical milling and die sinking machine

motor pulleys, providing 10 spindle speeds.

Feed is taken direct from the motor through helical gears and vertical shaft to gear box. Six feeds are available for each spindle speed with maximum and minimum longitudinal feed of 0.047—0.0004 per revolution. Longitudinal feeds per minute with a 1800 RPM motor are 1.75 to 28 inches; with 1200 RPM motor 1.15 to 18½ inches.



TO THE LETTER

BETHLEHEM STEEL

ABLE and experienced personnel, modern, large-capacity sheared and universal mills with complete steel-producing units right at hand to feed them, enable Bethlehem to fill your steel-plate specifications TO THE LETTER. Bethlehem Steel Company, General Offices: Bethlehem, Pa.

BETHLEHEM STEEL PLATES

Steel Wage Advance Driving in Contracts

Consumers Anticipate Price Increases—Revisions May Be Announced This Week —Three Large Rail Tonnages Awarded—Operating Rate Holds at 49 Per Cent

FIRST reaction to the general 10 per cent wage advance in the iron and steel industry, which with the increase under the code last fall practically restores wages to their pre-depression levels, has been a bulge in consumer commitments for second quarter.

Users generally have assumed that higher costs will be followed by a rise in prices, and voluntarily have moved to cover requirements. The effect of this may be to prevent producers from obtaining immediate and reasonably compensating benefits through lifting prices. Only by withdrawing from the market temporarily can they escape the consequence of the code rule for giving 10-days notice ahead of such revisions.

With costs up April 1, and more than 50 per cent of second quarter tonnage now under contract, the industry faces the prospect of operating through a considerable portion of the next three months on reduced earnings.

Sentiment in the industry is strong for immediate action on prices, indications pointing to first announcements this week. Semifinished steels are understood to be scheduled for advances ranging from $1 to $4 a ton; plates, shapes and bars, $2; sheets, $3 to $5.

Steel Rate Expected To Rise This Week; Automobile Production Expands

Consumers specified practically all the material due them on first quarter contracts, and steelworks operations last week held at 49 per cent, with indications that the stronger market will lift the rate this week. Pittsburgh was up 3 points to 36 per cent; eastern Pennsylvania 1½ to 34½. Cleveland was down 10 points to 72; Youngstown 2 to 54; New England 2 to 69. Detroit continued 100 per cent; Chicago 48½; Birmingham and Buffalo 52.

Wage increases in the automobile and steel industries have broadened the market for motorcars. The response to the automobile labor settlement was an expansion in output last week, which for the first time this year ran ahead of current retail demand. Two-thirds of the cars now being made are for delivery to actual buyers, and one-third toward building up stocks for May and June. While there has been no recession in demand from the industry, steelmakers do not look for marked gains immediately.

Strong support is being given by rail and equipment orders. Chicago mills have sufficient rail tonnage for two-months capacity operations; greater production in the Pittsburgh district is likely to lift the steelworks rate there again this week. Erie railroad has ordered 44,121 tons of rails and fastenings; Boston & Maine, 30,000 tons, while New York Central has purchased 38,900 tons of rails and several thousand tons of accessories.

500,000 Tons of Rails Placed Since Price Was Reduced; Scrap Composite Lower

Since the steel industry reduced its rail price last November, actual orders have totaled approximately 500,000 tons, out of 844,525 tons promised by the government. Pending for early award is 79,000 tons additional. Builders are ordering material for freight cars recently purchased by the Van Sweringen and other lines. New inquiries include 1000 steel box cars for the Seaboard Air Line; 500 for Chicago Great Western, and 100 for Savannah & Atlanta.

Building construction is not developing as well as expected; shape awards for the week were down to 11,138 tons, much less than the recent average. For Boulder dam 6000 tons of reinforcing bars have been awarded.

Tin plate specifications are brisk, and production fractionally higher. Output this year is expected to exceed the 1,673,962 tons of 1933, and compare favorably with the 1,800,007 tons in 1929. The movement of oil country material is in slightly better volume.

A stronger undertone in the market for scrap is noted at Pittsburgh, but Chicago prices are off 25 to 50 cents a ton, and STEEL's composite is 16 cents lower, at $12.17. Though the Ford Motor Co. has inquired for 50,000 tons of iron ore, producers may delay prices, in anticipation of higher vessel rates. Wage advances in the coal fields point to stronger pig iron prices. A lake merchant furnace interest in March booked 100,000 tons for second quarter. Shipments last month were 40 per cent higher than in February; and producers believe April will improve over March. Domestic fluorspar prices have been advanced 50 cents a ton.

STEEL's iron and steel price composite remains $32.40, and the finished steel index $51.10.

COMPOSITE MARKET AVERAGES

	March 31	March 24	One Month Ago March, 1934	Three Months Ago Jan., 1934	One Year Ago April, 1933	Ten Years Ago April, 1924
Iron and Steel Composite	$32.40	$32.40	$32.40	$32.42	$28.16	$42.33
Finished Steel Composite	51.10	51.10	51.10	51.10	44.94	65.93
Steelworks Scrap Composite	12.17	12.33	12.30	11.24	7.23	14.58

Iron and Steel Composite:—Pig iron, billets, slabs, sheet bars, wire rods, tin plate, nails, sheets, plates, shapes, bars, and black pipe. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

	March 31, 1934	Mar. 1934	Jan. 1934	April 1933
Finished Material				
Steel bars, Pittsburgh	1.75	1.75	1.75	1.60
Steel bars, Chicago	1.80	1.80	1.80	1.70
Steel bars, Philadelphia	2.04	2.04	2.04	1.91
Iron bars, Terre Haute, Ind.	1.60	1.60	1.60	1.65
Shapes, Pittsburgh	1.70	1.70	1.70	1.60
Shapes, Philadelphia	1.90	1.90	1.90½	1.65
Shapes, Chicago	1.75	1.75	1.75	1.70
Tank plates, Pittsburgh	1.70	1.70	1.70	1.55
Tank plates, Philadelphia	1.88	1.88½	1.88½	1.49½
Tank plates, Chicago	1.75	1.75	1.75	1.70
Sheets, No. 10, hot rolled, Pitts.	1.75	1.75	1.75	1.55
Sheets, No. 24, hot ann., Pitts.	2.25	2.25	2.25	2.00
Sheets, No. 24, galvan., Pitts.	2.85	2.85	2.85	2.65
Sheets, No. 10, hot rolled, Gary	1.85	1.85	1.85	1.70
Sheets, No. 24, hot anneal., Gary	2.35	2.35	2.35	2.10
Sheets, No. 24, galvan., Gary	2.95	2.95	2.95	2.75
Plain wire, Pittsburgh	2.20	2.20	2.20	2.10
Tin plate, per base box, Pitts.	5.25	5.25	5.25	4.25
Wire nails, Pittsburgh	2.35	2.35	2.35	1.85
Semifinished Material				
Sheet bars, open-hearth, Youngs.	26.00	26.00	26.00	26.00
Sheet bars, open-hearth, Pitts.	26.00	26.00	26.00	26.00
Billets, open-hearth, Pittsburgh	26.00	26.00	26.00	26.00
Wire rods, Pittsburgh	36.00	36.00	36.00	35.00

	March 31, 1934	Mar. 1934	Jan. 1934	April 1933
Pig Iron				
Bessemer, del. Pittsburgh	19.26	19.26	19.26	16.26
Basic, Valley	17.00	17.00	17.00	14.00
Basic, eastern, del. eastern Pa.	18.76	18.76	18.76	14.19
No. 2 foundry, del. Pittsburgh	18.76	18.76	18.76	15.76
No. 2 foundry, Chicago	17.50	17.50	17.50	15.50
Southern, No. 2, Birmingham	13.50	13.50	13.50	11.40
No. 2X, Eastern, del. Philadelphia	19.63	19.63	19.63	13.76
Malleable, valley	17.50	17.50	17.50	14.50
Malleable, Chicago	17.50	17.50	17.50	15.50
Lake Superior charcoal, del. Chi.	23.54	23.54	23.54	23.04
Gray forge, del. Pittsburgh	18.38	18.38	18.38	15.63
Ferromanganese, del. Pittsburgh	90.24	90.24	90.24	73.24
Scrap				
Heavy melting steel, Pittsburgh	$14.25	14.30	13.05	9.90
Heavy melting steel, eastern Pa.	11.50	11.70	11.65	6.90
Heavy melting steel, Chicago	11.75	12.00	10.45	6.55
No. 1 wrought, eastern Pa.	12.25	12.75	12.75	7.35
No. 1 wrought, Chicago	10.90	10.80	9.45	5.50
Rails for rolling, Chicago	12.75	12.75	11.25	8.50
Coke				
Connellsville, furnace, ovens	3.25	3.35	3.60	1.75
Connellsville, foundry, ovens	4.25	4.25	4.25	2.25

Steel, Iron, Raw Material and Metals Prices

Prices conform to American Iron and Steel institute schedules. Asterisks denote price changes this week

Sheet Steel

HOT ROLLED No. 10
(24 to 48 inches wide)

Pittsburgh, base	1.75c
Gary, base	1.85c
Chicago, del.	1.88c
New York, del.	2.08c
Philadelphia, del.	2.04c
Birmingham, base	1.90c
St. Louis, del.	2.07c
F.o.b. cars, dock, Pacific ports	2.42½c

HOT ROLLED ANN. No. 24

Pittsburgh, base	2.25c
Gary, base	2.35c
Chicago, del.	2.38c
Detroit, del.	2.45c
New York, del.	2.58c
Philadelphia, del.	2.54c
Birmingham, base	2.40c
St. Louis, del.	2.57c
F.o.b. cars, dock, Pacific ports	2.95c

GALVANIZED No. 24

Pittsburgh, base	2.85c
Gary, base	2.95c
Chicago, del.	2.98c
Philadelphia, del.	3.14c
New York, del.	3.18c
Birmingham, base	3.00c
St. Louis, del.	3.17c
San Francisco, f.o.b. cars, dock	3.55c

TIN MILL BLACK No. 28

Pittsburgh, base	2.65c
Gary, base	2.75c
St. Louis, del.	2.97c

COLD ROLLED No. 10

Pittsburgh, base	2.30c
Gary, base	2.40c
Detroit, delivered	2.50c
Philadelphia, del.	2.59c
New York, del.	2.63c

COLD ROLLED No. 20

Pittsburgh, base	2.75c
Gary, base	2.85c
Detroit, delivered	2.95c
Philadelphia, del.	3.04c
New York, del.	3.08c

ENAMELING SHEETS

Pittsburgh, No. 10	2.45c
Pittsburgh, No. 20	2.90c

Tin and Terne Plate

Per 100-lb. box, Pittsburgh. Gary base, 10 cents higher

Tin plate, coke base contract	$5.25
Do., stock	4.55
Long ternes, No. 24 unassorted	3.25c

Corrosion and Heat Resistant Alloys

Base, Pittsburgh

18% chrome, 8% nickel; sheets, 35c; plates, 28c; bars, 24c; hot-rolled strip, 24.50c; cold-rolled strip, 32.00c.

	A	B	C	D
Bars	17c	18.5c	21c	26c
Plates	20c	21.5c	24c	29c
Sheets	25c	28c	31c	35c
Hot strip	17c	18.5c	21c	26c
Cold strip	22.5c	24c	27c	35c

Carbon 0.12 and under; no nickel. A has chrome 15% and under. B over 15/18% inc., C over 19/23% inc., D over 23/30%.

Steel Plates

Pittsburgh, base	1.70c
New York, del.	1.98c
Philadelphia, del.	1.88½c
Boston, del.	2.10c
Buffalo, del.	1.93½c
Chicago, base	1.75c
Cleveland, del.	1.88½c
Birmingham, base	1.85c
Coatesville, base	1.80c
Sparrows Pt., base	1.80c
Pacific Coast, f.o.b. cars, dock	2.25c
St. Louis, del.	1.97c

Structural Shapes

Pittsburgh, base	1.70c
Philadelphia, del.	1.90½c
New York, del.	1.95½c
Boston, del.	2.08½c
Bethlehem, base	1.80c
Chicago, base	1.75c
Cleveland, del.	1.88½c
Buffalo, base	1.80c
Birmingham, base	1.85c
Pacific Coast, f.o.b. cars, dock	2.25c

Bars

SOFT STEEL

Pittsburgh, base	1.75c
Chicago, base	1.80c
Birmingham, base	1.90c
Buffalo, base	1.85c
Cleveland, base	1.80c
Detroit, del.	1.90c
Pacific Coast ports, cars, dock, c.i.f.	2.30c
Philadelphia, del.	2.04c
Boston, del.	2.15c
New York, del.	2.08c
Pitts., forg. qual.	1.75c-2.25c

RAIL STEEL
To Manufacturing Trade

Pittsburgh	1.65c
Chicago	1.70c
Cleveland	1.70c
Gary, Ind.	1.70c
Buffalo	1.75c

IRON

Terre Haute, Ind. base	1.60c
Philadelphia, base..	1.74c
Pittsburgh, refined..	2.75c-7.50c

REINFORCING
New billet, cut lengths, carlots

Pittsburgh	1.90c
Chicago, Gary, Buffalo, Cleve., Birm., Young...	1.95c
Gulf ports	2.30c
Pacific coast ports	2.45c
Philadelphia, del.	2.19c

Rail Steel

Pittsburgh, base	1.75c
Chicago, Buffalo, Cleveland, Birm., Young.	1.80c
Gulf ports	2.15c
Pacific coast ports	2.30c

Wire Products □ □

(Prices apply to straight or mixed carloads; pool cars, or less, 10c up. 10% dis. on nail extras on straight or mixed carloads to one consignee.)

Base, Pittsburgh-Cleveland (Per 100-lb. keg)

Standard wire nails	$2.35
Cement coated nails	2.35
Galvanized nails, 15 gage and coarser	4.35c
Do., 16 gage and finer..	4.85c

(Per pound)

Polished staples	3.05c
Galvanized fence staples	3.30c
Barbed wire, galv.	2.85c
Annealed fence wire	2.35c
Galvanized fence wire....	2.70c
Woven wire fencing (base column, c.l.)	$60.00
Plain wire, 6-9 gage to mfg. trade	2.20c

Anderson, Ind., Chicago up $1; Duluth up $2; Birmingham up $3.

Spring wire	3.20c

Chicago and Waukegan $1 higher, Worcester $2 higher.

Cold-Finished Carbon Bars

Base Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs.	2.10c
20,000 to 59,999 lbs.	2.05c
60,000 to 99,999 lbs.	2.00c
100,000 lbs. and over	1.97½c

Chicago, Cleveland, up 5c; Buffalo, up 10c; Detroit, up 20c; eastern Michigan, up 25c.

Shafting □ □ □

Turned and ground, Pitts. base

1⅛-inch	3.40c
1 3/16 to 1½-inch	2.90c
1 3/16 to 1⅞-inch	2 75c
1 15/16 to 2⅞-inch	2.60c
2 15/16 to 7-inch	2.45c

Alloy Steel Bars □

Hot Rolled

Pittsburgh, Buffalo, Chicago, Massillon, Canton	2.45c
Bethlehem	2.55c

Alloy	S.A.E.	Diff.	Alloy	S.A.E.	Diff.
2000		0.25	3100		0.55
2100		0.55	3200		1.35
2300		1.50	3300		3.80
2500		2.25	3400		3.20

4100 .15 to .25 Mo	0.50
4600 .20 to .30 Mo. 125-1.75 Ni.	1.05
5100 .80-1.10 Cr	0.45
5100 Cr. spring	base
6100 bars	1.20
6100 spring	0.70
Cr., Ni., Van	1.50
Carbon van.	0.95
9250	carbon base plus extras

Strip and Hoops □

Hot strip to 23⅛-in. Pittsburgh	1.75c
Do., Chicago	1.85c
Do., del. Detroit..	1.95c
Do., del. Phila....	2.04c
Do., del. N. Y.	2.08c
Cooperage hoop, Pittsburgh	1.85c
Do., Chicago	1.95c
Cold-rolled strip, Pitts., Cleve.	2.40c
Worcester	2.60c

Rails, Track Material □

(Gross Ton)

Standard rails, mill	$36.37½
Relay rails. Pitts. 20-45 lbs.	$26.00
50-60 lbs.	$23.00
70-75 lbs.	$18.00
80-85 lbs.	$25.00
100 lbs.	$26.00
Light rails, billet qual., Pitts., Chi.	$32.00
Do., reroll. qual....	$31.00
Angle bars, mills...	2.55c
Spikes, R. R. base..	2.40c
Track bolts, base....	3.55c
Tie plates, base	1.90c

Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up $5; 16 and 20 lbs., up $1; 12 lbs., up $2; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons or more; diff. for less.

Bolts and Nuts □ □

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade for all case lots. Dec. 1, 1932, lists.

CARRIAGE BOLTS

All sizes, cut thread	70 off
Rolled thread, ½ x 6 and smaller	70 off

MACHINE BOLTS

All sizes, cut thread, lag Screws, plow bolts, Nos. 1-2-3-7 heads, tap bolts, blank bolts, stud bolts, without nuts	70 off
Tire bolts	60 off
Stove bolts, 70-25-10 off in pkgs.; 83 off in bulk, 5000 or more of a size.	
Rolled thread machine bolts, ½ x 6 and smaller,	70 off
Step bolts	66 off
Elevator bolts	66 off

NUTS

Semifinished	70 off

HEXAGON CAP SCREWS

Milled	80-10-10 off
Upset 1-in., smaller	85 off

SQUARE HEAD SET Screws

Upset, 1-in., smaller	75-10 off
Upset, larger than 1-in.	75-10 off
Headless set screws	75 off

Rivets, Wrought Washers

Struc., c.l., Pittsburgh, Cleveland	2.75c
Struc., c.l., Chicago	2.85c
⅞-in. and smaller, Pitts., Chi., Cleve..	70 and 10 off
Wrought washers, Pitts., Chi., Phila..	6.00-6.25 off

Cut Nails, Piling □

Cut nails, Pitts:; (10% discount on size extras)	$2.75
Do. less carloads, 5 kegs or more; no discount on size extras	$3.05
Do., less than 5 kegs; no discount on size extras	$3.20
Steel piling, Pittsburgh	2.00c
Steel piling, Chi., Buff.	2.10c

Pipe and Tubing

Base $200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago delivered 2½ points less. Wrought pipe, Pittsburgh base.

BUTT WELD

Steel

In.	Blk.	Gal.
¼ and ⅜	57	38½
½	62	50½
¾	65½	55½
1—3	67½	58½

Iron

½	31½	15
¾	36½	20½
1—1¼	39½	25½
2	41½	26

LAP WELD

Steel

2	63½	54½
2½—3	66½	57½
3½—6	68½	59½
7 and 8	67½	57½
9 and 10	67	57

Iron

2	37	22½
2½—3½	38	25
4—8	40	28½

LINE PIPE

Steel

⅛-inch, butt weld	50½
¼—⅜, butt weld	56
½, butt weld	61
¾, butt weld	64½
1—3, butt weld	66½
2-inch, lap weld	62½
2½—3, lap weld	65½
3½—6, lap weld	67½
7—8, lap weld	66½

Iron

⅛—1½-inch, black and galv. take 4 pts. over; 2½—6-inch 2 pts. over discounts for same sizes, standard pipe lists. 8—12-inch, no extra.

BOILER TUBES

C. L. Discounts, f.o.b. Pitts.

Lap Weld Steel		*Charcoal Iron*	
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3½	50	3	17
4	52	3¾—3½	18
4½—5	42	4	20
		4½	21

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7½% discount on steel and 10% on charcoal iron.

Lapwelded steel: 2000 to 9999 pounds, ten points under base, one 5% and one 7½%. Under 2000 pounds 15 points under base, one 5% and one 7½%. Charcoal iron: 10,000 pounds to carloads, base less 5%; under 10,000 pounds, two points under base only.

SEAMLESS BOILER TUBES

Cold Drawn

2—2¼	27	3¼—3½	41
2½—2¾	34	4	43
3	38	4½, 5, 6	36

(On 1—1¾-inch sizes mechanical tubing dis. apply.)

Hot Rolled

2—2¼	33	3¼—3½	47
2½—2¾	40	4	49
3	44	4½, 5, 6	42

Quantity discounts: Carload and more gets preferential of two 5%; 2000 to 9999 pounds, 10 points off base and one 5%; under 2000 pounds, 15 points under base and one 5%.

Seamless Tubing □

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs.	32%
15,000 ft. or 22,500 lbs.	70%

Cast Iron Water Pipe □

Class B Pipe—Pet Net Ton

6-in., & over, Birm.	$36.00-37.00
4-in., Birm.	39.00-40.00
4-in., Chicago	47.00-48.00
6 to 24-in., Chicago	44.00-45.00
6-in., & over, east. fdy.	40.00
Do., 4-in.	43.00

Class A pipe $3 over Class B. Stnd. fitgs., Birm. base.... $90.00

Six to 24-inch, fittings base; over 24-inch plus $20; 4-inch, plus $10; 3-inch, plus $20; gas pipe fittings, 5 higher.

Semifinished Steel □

Prices Per Gross Ton

BILLETS AND BLOOMS

4 x 4-inch base

Pitts., Chi., Cleve., open-hth. & bess.	$26.00
Philadelphia	31.30
Forgings, Pitts., Chi.	31.00

SHEET BARS

Pitts., Cleve., Young.	26.00
Chicago	26.00
Canton, O.	26.00

SLABS

Pitts., Cleve., Young.	26.00

WIRE RODS

Pitts., Cleveland	36.00
Chicago	37.00

SKELP

All grades, Pitts., and Chicago	1.60c

Coke □ □ □

Price Per Net Ton

BEEHIVE OVENS

Connellsville fur.	$3.25- 3.50
Connellsville fdry.	4.25
Connell. prem. fdy.	5.00
New River fdry.	6.00
Wise county fdry.	4.25- 5.00
Wise county fur.	3.50- 4.25

BY-PRODUCT FOUNDRY

Newark, N. J., del.	8.71- 9.31
Chi., ov., outside del.	8.50
Chicago, del	9.25
New England, del.	10.50
St. Louis, del.	9.25
Birmingham, ovens	5.00
Indianapolis, del.	8.75
Cincinnati, del.	9.30
Cleveland, del.	9.25
Buffalo, ovens	7.50- 8.00
Detroit, ovens	8.50
Philadelphia, del.	9.00

Coke By-Products □

Per gallon, producers' plants.

Tank lots

	Spot
Pure benzol	$0.205
90 per cent benzol..	$0.205
Toluol	0.30
Solvent naphtha	0.26
Commercial xylol	0.26

Per lb. f.o.b. New York

Phenol (200 lb. drums)..	0.163c
Do. (100 lbs.)	0.173

Eastern Plants, Per Pound, In Barrels

†Naphthalene flakes and balls	6.00

Per 100 lb. Atlantic seaboard

Sulphate of ammonia	$1.25
†Western prices	½-cent higher per pound.

Pig Iron

Delivered prices do not include switching charges except as noted. No. 2 foundry iron is 1.75-2.25 silicon; 25-cent differentials apply for each 0.25 silicon above 2.25. Gross tons.

	No. 2 Fdry.	Malleable	Basic	Bessemer
Basing Points:				
Bethlehem, Pa.	$18.50	$19.00	$18.00	$19.50
Birdsboro, Pa.	18.50	19.00	18.00	19.50
Swedeland, Pa.	18.50	19.00	18.00	19.50
Sparrows Point, Md.	18.50	.....	18.00	.....
From Swedeland, Pa., del. to Philadelphia	19.26	19.76	18.76	.....
From Bethlehem, del. to Brooklyn	20.77	21.27	.....	.....
From Bethlehem, del. to Newark, N. J.	19.99	20.39	.....	.....
Basing Point:				
Everett, Mass.	18.50	19.00	18.00	19.50
From Everett, del. to Boston	19.00	19.50	18.50	20.00
Basing Point:				
Buffalo	17.50	18.00	16.50	18.50
From Buffalo, del. to Boston	19.00	19.50	18.50	20.00
Basing Points:				
Neville Island, Pa.	18.00	18.00	17.00	18.50
Sharpsville, Pa.	17.50	17.50	17.00	18.00
Youngstown, O.	17.50	17.50	17.00	18.00
From Neville Island, Pa., del. to Pittsburgh district	(Neville Island base, plus 63c to $1.13 switching charges)			
Basing Points:				
Erie, Pa.	17.50	18.00	17.00	18.50
Cleveland	17.50	17.50	17.00	18.00
Toledo, O.	17.50	17.50	17.00	18.00
Detroit	17.50	17.50	17.00	18.00
From Detroit, del. to Saginaw, Mich.	19.60	19.60	19.10	20.10
From Cleveland, del. to Akron, Canton, O.	18.76	18.76	18.26	19.26
From Toledo, del. to Mansfield, O.	19.26	19.26	18.76	19.76
Basing Point:				
Jackson, O.	19.25	19.25	18.75	.....
Hamilton, O.	17.50	17.50	17.00	18.00
From Hamilton, del. to Cincinnati	18.51	18.51	18.01	19.01
Do., del. to Indianapolis	19.77	19.77	19.27	20.27
Basing Points:				
Duluth	18.00	18.00	.....	18.50
Chicago	17.50	17.50	17.00	18.00
Granite City, Ill.	17.50	18.00	17.00	.....
From Duluth, del. to St. Paul	19.94	19.94	.....	20.44
From Chicago, del. to Milwaukee	18.50	18.50	18.00	19.00
From Chicago, Toledo or Detroit, del. to Muskegon, Mich.	20.40	20.40	19.90	20.90
From Granite City, del. to St. Louis	18.00	18.50	17.50	.....
Basing Point:				
†Birmingham, Ala.	13.50	.....	12.50	18.00
From Birmingham, del. to:				
Boston	18.62	.....	18.50	.....
Newark, N. J.	19.58	.....	.....	.....
Brooklyn, N. Y.	20.39	.....	.....	.....
Baltimore	19.02	.....	18.90	.....
Philadelphia	18.88	.....	18.76	.....
Cleveland	17.62	.....	17.50	.....
Cincinnati	18.13	.....	17.51	.....
Chicago	*17.72	.....	17.60	.....
St. Louis	17.62	.....	17.50	.....

†Southern delivery only. Prices at northern points are adjusted to quotations on northern iron. *Over 0.70 phos.

Basing Point:	
Provo, Utah	16.50

LOW PHOS.

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.—$23.00 Basing point: †Johnson City, Tenn.—$23.00 †Offgrade material is $19.

Philadelphia, standard and copper bearing	24.13

GRAY FORGE		CHARCOAL	
Valley furnace	17.25	Lake Superior fur.	20.50
Pitts. dist. fur.	17.75	Do., del. Chicago	23.54

SILVERY

Jackson county, O., base; 6%—$22.25; 7—$23.25; 8—$24.25; 9—$25.25; 10—$26.25; 11—$27.75.

BESSEMER FERROSILICON

Jackson County, O., base; 10%—$27.25; 11—$28.75; 12—$30.25; 13—$31.75; 14—$33.25; 15—$34.75; 16—$36.25.

Iron Ore

LAKE SUPERIOR ORE

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.80
Mesabi bessemer	4.65
Old range nonbess.	4.65
Mesabi nonbess.	4.50
High phosphorus	4.40

EASTERN LOCAL ORES

Cents, unit, del. E. Pa.

Foundry and basic, 56-63% con. (nom.)	8.00- 9.00
Cop.-free low phos. 58-65% (nom.)	10.00-10.50

FOREIGN ORE

Cents per unit, f.a.s. Atlantic ports (nominal)

Foreign manganiferous ore, 45.55% iron, 6-10% man.	10.00
No. Afr. & low phos.	9.50
Swedish basic, 65%	9.00
Swedish low phos.	9.50
Spanish No. Africa basic, 50 to 60%	9.00
Tungsten, spot, sh. ton unit, duty pd.	$14.00-14.25
N. F. fdy., 55%	7.00
Chrome ore 48% gross ton, c.i.f.	$18.00

Manganese Ore

(Nominal)

Prices, not including duty, cents per unit, cargo lots.

Caucasian, 52-55%	24.00
So. African, 52%	24.00
So. Afr., 49-51%	22.00
Indian, 58-50%	nominal
Indian, 48-50%	nominal

Refractories

Per 1000 f.o.b. Works

FIRE CLAY BRICK

First Quality

Pa., Ohio, Ill., Ky., Md., Ga., Mo.	$45.00
Alabama	48.00

Second Quality

Pa., Ohio, Ill., Ky., Md., Mo., Ga., Ala.	40.00
MALLEABLE BUNG BRICK all bases	50.00

SILICA BRICK

Pennsylvania	$45.00
Joliet, E. Chicago	54.00
Birmingham, Ala.	52.00

MAGNESITE

Dead burned grain, Chester, Pa., Baltimore bases, net	40.00
Domes, Chewelah, Wash., base	22.00

BASIC BRICK

Net ton, f.o.b. Baltimore, Plymouth, Meeting, Pa., Chester, Pa.

Magnesite brick	$65.00
Chrome brick	45.00
Chemically bonded magnesite	55.00

Fluorspar 85-5

Washed gravel, duty paid, tide, net ton	$19.00
*Washed gravel, f.o.b. Ill., Ky., net ton, carloads	$17.00

Ferroalloys

Dollars, except Ferrochrome

Ferromanganese, 78-82% tidewater, duty paid	85.00
del. Pittsburgh	90.24
Spiegeleisen, 19-20%, dom. fur. spot†	26.00
Ferrosilicon, 50%, freight all., cl.	77.50
Do., less carload	85.00
Do., 75 per cent. Spot, $5 a ton higher.	126-130.00
Silicomang., 2½ carb	90.00
2% carbon	95.00
1% carbon	105.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. con. del.	10.00
Ferrotungsten, stand., lb. cont.	1.16- 1.25
Ferrovanadium, 35 to 40%, lb. cont., on analysis	2.70- 2.90
Ferrotitanium, c. l., prod. plant, frt. allow., net ton	137.50
Spot, 1 ton, frt., allow., lb.	7.00
Do., under 1 ton	7.50
Ferrophosphorus, per ton, c. l., 17-19%, Rockdale, Tenn., basis, 18%, $2 unitage	50.00
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $2.75 unitage	65.00
Ferromolybdenum, stand. 50-60%, lb.	0.95
Molybdate, lb. cont.	0.80

†Carloads. Quan. diff. apply.

Nonferrous Mill Products

F.o.b. mill base, cents per lb. except as specified. Copper, brass products based on 8.25c Conn. copper

Sheets	
Yellow brass (high)	13.75
Copper, hot rolled	15.00
Lead, cut, to jobbers	7.75
Zinc, 100-lb. base	9.00
Tubes and Pipes	
High yellow brass	16.25
Seamless copper	16.25
Rods	
High yellow brass	12.25
Copper, hot rolled	12.25
Anodes	
Copper, untrimmed	12.75
Wire	
Yellow brass (high)	14.25

Old Metals

Deal. buying prices, cents lb.

No. 1 Composition Red Brass	
New York	4.50- 4.75
Chicago	4.37½-4.87½
Cleveland	5.00- 5.25
St. Louis	4.75- 5.00
Heavy Copper and Wire	
New York	6.12½- 6.25
Chicago, No. 1	5.75- 6.00
Cleveland	5.50- 5.75
St. Louis	5.75- 6.00
Composition Brass Borings	
New York	4.25- 4.50
Light Copper	
New York	5.25- 5.50
Chicago	4.50- 4.75
Cleveland	5.00- 5.25
St. Louis	4.75- 5.00
Light Brass	
Chicago	2.50- 2.75
Cleveland	3.00- 3.25
Lead	
New York	3.00- 3.25
Cleveland	3.00- 3.25
Chicago	2.75- 3.00
St. Louis	3.10- 3.25
Zinc	
New York	2.25- 2.50
*Cleveland	2.25- 2.50
Chicago	2.25- 2.50
St. Louis	2.75- 3.00
Aluminum	
Clips, soft, Cleve.	13.00-14.00
Borings, Cleveland	7.00- 7.50
Mixed, cast, Cleve.	11.00-11.25
*Mixed, cast, St. L.	11.00-11.25

Secondary Metals

Brass ingot, 85-5-5-5	8.25
Remelt al. No. 12	15.50-16.00

Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL

Birmingham	9.50-10.00
Boston, dealers	7.25- 7.50
Buffalo, No. 1	12.75-13.25
Buffalo, No. 2	11.25-11.75
Chicago	11.50-12.00
Cleveland, No. 1	12.00-12.50
Cleveland, No. 2	11.50-12.00
Detroit, No. 1	10.00-10.50
Detroit, No. 2	9.00- 9.50
Eastern Pa.	11.50
Eastern Pa., No. 2	9.50
Federal, Ill.	8.75- 9.25
Granite City, R. R.	9.00- 9.50
Granite City, No. 2	7.75- 8.75
N. Y., deal. R. R.	9.50
N. Y., deal. No. 2	8.00
Pittsburgh, No. 1	14.00-14.50
Valleys, No. 1	14.50-15.00

COMPRESSED SHEETS

Buffalo, dealers	11.25-11.75
Chicago, factory	10.50-11.00
Cleveland	11.00-11.50
Detroit	10.00-10.50
E. Pa., new mat.	10.50
Pittsburgh	14.00-14.50
St. Louis	8.50- 9.00
Valleys	14.00-14.50

BUNDLED SHEETS

Buffalo	7.50- 8.00
Cincinnati, del.	7.50- 8.00
Cleveland	8.50- 9.00
Pittsburgh	12.50-13.00
St. Louis	6.25- 6.75

SHEET CLIPPINGS LOOSE

Chicago	6.50- 7.00
Cincinnati	7.00- 7.50
Detroit	6.50- 7.00
St. Louis	5.75- 6.25

STEEL RAILS, SHORT

Birmingham	12.00-12.50
Boston, dealers	7.25- 7.50
Buffalo	14.00-14.50
Chicago (3 ft.)	12.50-13.00
Chicago (2 ft.)	13.00-13.50
Cincinnati, del.	13.00-13.50
Detroit	11.50-12.00
Pitts., (open-hearth 3 ft. and less	15.75-16.25
St. Louis, 2 ft. & less	12.50-13.00

STOVE PLATE

Birmingham	6.50- 7.00
Boston, dealers	4.75- 5.00
Buffalo	10.75-11.25
Chicago, net	7.75- 8.25
Cincinnati, dealers	7.00- 7.50
Detroit, net	7.50- 8.00
Eastern Pa.	8.50- 9.00
N. Y., deal. fdry.	6.00
St. Louis	7.00- 7.50

COUPLERS, SPRINGS

Buffalo	13.75-14.25
Chicago, springs	12.50-13.00
Eastern Pa.	15.50
Pittsburgh	16.00-16.25
St. Louis	9.50-10.00

ANGLE BARS—STEEL

Chicago	12.50-13.00
St. Louis	9.50-10.00

LOW PHOSPHORUS

Buffalo, billets and bloom crops	14.00-14.50
Cleveland, billet, bloom crops	14.00-14.50
Eastern Pa. crops	14.00-14.50
Pittsburgh, billet, bloom crops	17.00-17.50
Pittsburgh, sheet bar crops	16.00-16.50

FROGS, SWITCHES

Chicago	11.50-12.00
St. Louis, cut	9.50-10.00

SHOVELING STEEL

Chicago	11.50-12.00
Federal, Ill.	7.75- 8.25
Granite City, Ill.	8.75- 9.25

RAILROAD WROUGHT

Birmingham	7.00- 8.00
Boston, dealers	6.00- 6.50
Buffalo, No. 1	9.75-10.25
Buffalo, No. 2	12.75-13.25
Chicago, No. 1, net	9.50-10.00
Chicago, No. 2	11.50-12.00
Cincinnati, No. 2	9.50-10.00
Eastern Pa.	12.00-12.50
N. Y., No. 1 deal	8.00- 8.50
St. Louis, No. 1	7.00- 7.50
St. Louis, No. 2	8.75- 9.25

SPECIFICATION PIPE

Boston	4.50- 4.75
Eastern Pa.	9.50
New York, dealers	5.25- 5.50

BUSHELING

Buffalo, No. 1	11.25-11.75
Chicago, No. 1	10.50-10.75
Cinci., No. 1 deal	7.00- 7.50
Cincinnati, No. 2	5.00- 5.50
Cleveland, No. 2	9.00- 9.50
Detroit, No. 1 new	9.00- 9.50
Valleys, new No. 1	14.00-14.50

MACHINE TURNINGS

Bimingham	4.50- 5.00
Boston, dealers	4.00- 4.25
Buffalo	7.25- 7.75
Chicago	7.50- 8.00
Cincinnati, dealers	6.00- 6.50
Cleveland	9.00- 9.50
Detroit	6.50- 7.00
Eastern Pa.	7.50
New York, dealers	3.25- 3.50
Pittsburgh	10.50-11.00
St. Louis	5.25- 5.75
Valleys	12.00-12.50

BORINGS AND TURNINGS

For Blast Furnace Use

Boston, dealers	3.25- 3.50
Buffalo	7.75- 8.25
Cincinnati, dealers	6.00- 6.50
Cleveland	9.00- 9.50
Detroit	7.75- 8.25
Eastern Pa.	6.50
New York, dealers	2.00- 2.50
Pittsburgh	8.50- 9.00

CAST IRON BORINGS

Birmingham, plain	4.50- 5.00
Boston, chemical	8.50- 9.00
Boston, dealers	3.25- 3.50
Buffalo	7.50- 8.00
Chicago	7.50- 8.00
Cincinnati, dealers	6.00- 6.50
Cleveland	9.00- 9.50
Detroit	7.75- 8.25
E. Pa., chemical	12.00-15.00
New York, dealers	3.00- 3.50
Pittsburgh	8.50- 9.00
St. Louis	5.25- 5.75

PIPE AND FLUES

Cincinnati, dealers	4.50- 5.00

RAILROAD GRATE BARS

Buffalo	7.00- 7.50
Chicago, net	7.50- 8.00
Cincinnati	6.00- 6.50
Eastern Pa.	8.50- 9.00
New York, dealers	5.00- 5.50
St. Louis	6.00- 6.50

FORGE FLASHINGS

Boston, dealers	6.00- 6.50
Buffalo	11.25-11.75
Cleve., over 10 in.	9.25- 9.75
Detroit	8.50- 9.00

FORGE SCRAP

Boston, dealers	5.00- 6.00
Chicago, heavy	12.50-13.00
Eastern Pa.	10.50-11.00

ARCH BARS, TRANSOMS

St. Louis	10.25-10.75

AXLE TURNINGS

Boston, dealers	4.50- 5.00
Buffalo	9.00- 9.50
Chicago, elec. fur.	10.50-11.00
Cleveland	9.50-10.00
Eastern Pa.	11.00
St. Louis	7.50- 8.00

STEEL CAR AXLES

Birmingham	10.50-11.00
Boston, ship. point.	8.00- 8.50
Buffalo	13.00 13.50
Chicago, net	12.00-12.50
Eastern Pa.	14.00
St. Louis	10.50-11.00

SHAFTING

Boston, ship. point.	11.00-11.25
Eastern Pa.	16.25
New York, dealers	11.50-12.00
St. Louis	13.00-13.50

CAR WHEELS

Birmingham, iron	9.00- 9.50
Boston, iron deal.	6.50- 6.75
Buffalo, iron	12.25-12.75
Buffalo, steel	13.75-14.25
Chicago, iron	12.00-12.50
Chicago, rolled steel	12.50-13.00
Cincinnati, iron	10.25-10.50
Eastern Pa., iron	13.50-14.00
Eastern Pa., steel	15.00-15.50
Pittsburgh, iron	13.00-13.50
Pittsburgh, steel	16.00-16.50
St. Louis, iron	9.50-10.00
St. Louis, steel	9.50-10.00

NO. 1 CAST SCRAP

Birmingham	9.00- 9.50
Boston, No. 2	5.50- 6.00
Boston, tex. con.	10.50-11.00
Buffalo, cupola	12.00-12.50
Buffalo, mach.	13.25-13.75
Chicago, agri. net	8.25- 8.75
Chicago, mach. net	9.00-10.00
Chi., railroad net	9.00- 9.50
Cinci., mach. cup	10.75-11.25
Cleveland, cupola	11.50-12.50
Detroit, net	9.50-10.00
Eastern Pa., cupola	12.50
Pittsburgh, cupola	13.00-13.50
San Francisco, del.	13.50-14.00
Seattle	7.00- 8.50
St. Louis, No. 1	8.50- 9.00
St. L., No. 1 mach.	10.00-10.50

HEAVY CAST

Boston, del.	6.75- 7.00
Buffalo, break.	9.00- 9.50
Cleveland, break.	8.50- 9.00
Detroit, break.	8.50- 9.00
Detroit, auto net	11.00-11.50
Eastern Pa.	11.50-12.00
N. Y., No. 1, deal.	8.00- 8.50
N. Y., break. deal.	8.00- 8.50
Pittsburgh	12.00-12.50

MALLEABLE

Boston, consum.	12.50-13.00
Buffalo	13.25-13.75
Chicago, R. R.	12.25-12.75
Cincinnati, agri. del.	9.75-10.25
Cinci., R. R. del.	10.50-11.00
Cleveland, rail.	13.00-13.50
Detroit, auto	9.75-10.25
St. Louis, R. R.	9.75-10.25
Eastern Pa., R. R.	11.50-12.50

RAILS FOR ROLLING

5 feet and over

Birmingham	11.00-11.50
Boston, dealers	7.25- 7.50
Buffalo	12.00-12.50
Chicago	12.50-13.00
Eastern Pa.	13.00
New York, dealer	7.50- 8.00
St. Louis	11.00-11.50

LOCOMOTIVE TIRES

Chicago (cut)	12.50-13.00
St. Louis, No. 1	10.50-11.00

LOW PHOS. PUNCHINGS

Buffalo	13.75-14.25
Chicago	12.50-13.00
Eastern Pa.	14.50-15.00
Pittsburgh	16.00-16.50

Nonferrous Metal Prices of the Week

Spot unless otherwise specified. Cents per pound

	Copper: Electro., del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin: New York Spot	Straits Tin: New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 98-99%	Antimony Spot, N. Y.	Ingot Nickel
March 24	8.00	8.12½	7.75	54.20	54.25	4.00	3.90	4.35	*22.90	7.60	36.00
March 26	8.00	8.12½	7.75	54.65	54.70	4.00	3.90	4.35	*22.90	7.60	36.00
March 27	8.00	8.12½	7.75	54.45	54.50	4.00	3.90	4.32½	*22.90	7.60	36.00
March 28	8.00	8.12½	7.75	54.70	54.75	4.00	3.90	4.30	*22.90	7.60	36.00
March 29	8.00	8.12½	7.75	55.15	55.20	4.00	3.90	4.30	*22.90	7.60	36.00
March 30	8.00	8.12½	7.75	55.25	55.35	4.00	3.90	4.30	*22.90	7.60	36.00

*Nominal range 19.00 to 22.90c.

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS	
Baltimore*	2.75c
Boston††	2.90c
Buffalo	2.95c
Chattanooga	3.26c
Chicago	2.90c
Cincinnati	3.10c
Cleveland	2.90c
Detroit	2.98½c
Houston	3.00c
Los Angeles	3.40c
New Orleans	3.00c
New York‡(d)	3.17c
Pittsburgh	2.85c
Philadelphia*	2.75c
San Francisco	3.55c
Seattle	3.40c
St. Louis	3.14c
St. Paul	3.00c
Tulsa	3.25c

IRON BARS	
Portland	3.40c
Baltimore*	2.60c
Chattanooga	3.26c
Chicago	2.75c
Cincinnati	3.10c
Detroit	2.98½c
New York‡(d)	3.10c
Philadelphia*	2.75c
St. Louis	3.14c
Tulsa	3.25c

REINFORC. BARS	
Boston	2.75c-3.25c
Buffalo	1.95c
Chattanooga	3.26c
Chicago	1.95c-2.10c
Cleveland (c)	1.97½c
Cincinnati	3.10c
Houston	3.25c
Los Ang., cl...	2.15c
New Orleans	3.00c
New York	3.17c
Philadelphia	2.62½c
Pitts., plain	3.00c
Pitts., twisted squares	3.12½c
San Francisco	2.45c
Seattle	2.45c
St. Louis	3.29c
Tulsa	3.25c
Young.	2.30c-2.60c

SHAPES	
Baltimore*	2.75c
Boston††	3.07c
Buffalo	3.20c
Chattanooga	3.46c
Chicago	3.10c
Cincinnati	3.30c
Cleveland	3.21c
Detroit	3.30c
Houston	3.00c
Los Angeles	3.40c
New Orleans	3.50c
New York(d)	3.27c
Philadelphia*	2.75c
Pittsburgh	3.05c
Portland	3.40c
San Francisco	3.50c
Seattle	3.40c
St. Louis	3.34c
St. Paul	3.25c
Tulsa	3.50c

PLATES	
Baltimore*	2.75c
Boston††	3.08c
Buffalo	3.20c
Chattanooga	3.46c
Chicago	3.10c
Cincinnati	3.30c
Cleveland, ¼-in. and thicker	3.21c
Cleve., ⅜-in.	3.20c
Detroit	3.30c
Detroit, ⅜-in.	3.10c
Houston	3.00c
Los Angeles	3.40c
New Orleans	3.50c
New York(d)	3.30c
Philadelphia*	2.75c
Phila. floor	4.35c
Pittsburgh	3.05c
Portland	3.40c
San Francisco	3.50c
Seattle	3.40c
St. Louis	3.34c
St. Paul	3.25c
Tulsa	3.50c

NO. 10 BLUE	
Baltimore*	2.95c
Boston††	3.15c
Buffalo	3.10c
Chattanooga	3.26c
Chicago	2.95c
Cincinnati	3.10c
Cleveland	3.01c
Det., 8-10 ga.	3.03½c
Houston	3.35c
Los Angeles	3.65c
New Orleans	3.50c
New York	3.17c
Portland	3.65c
Philadelphia*	2.95c
Pittsburgh	2.85c
San Francisco	3.75c
Seattle	3.65c
St Louis	3.19c-3.36c
St. Paul	3.45c
Tulsa	3.70c

NO. 24 BLACK	
Baltimore*†	3.50c
Boston (g)	3.75c
Buffalo	3.25c
Chattanooga	4.01c
Chicago	3.70c
Cincinnati	3.85c
Cleveland	3.76c
Detroit	3.78½c
Los Angeles	4.15c
New York	3.65c
Philadelphia*†	3.40c
Pittsburgh**	3.40c
Portland	4.25c
San Francisco	4.25c
Seattle	4.25c
St. Louis	3.94c
St. Paul	3.695c
Tulsa	4.75c

NO. 24 GAL. SHEETS	
Baltimore*†	3.75c
Buffalo	4.00c
Boston (g)	4.35c
Chattanooga	4.61c
Chicago	4.20c-4.30c
Cincinnati	4.45c
Cleveland	4.36c
Detroit	4.45c
Houston	4.40c
Los Angeles	4.75c
New Orleans	4.35c
New York	4.25c
Pitts.**	3.90c-4.20c
Portland	4.85c
San Francisco	4.85c
Seattle	4.85c
St. Louis	4.54c
St. Paul	4.19c
Tulsa	5.10c
Philadelphia*†	4.00c

BANDS	
Baltimore	3.05c
Boston††	3.15c
Buffalo	3.30c
Chattanooga	3.51c
Chicago	3.20c
Cincinnati	3.35c
Cleveland	3.26c
Detroit, ⅛-in. and lighter	3.28½c
Houston	3.25c
Los Angeles	3.90c
New Orleans	3.20c
New York(d)	3.42c
Philadelphia	3.05c
Pittsburgh	3.10c
Portland	3.90c
San Francisco	4.05c
Seattle	3.90c
St. Paul	3.20c
Tulsa	3.45c
St. Louis	3.44c

HOOPS	
Baltimore	2.80c
Boston	4.15c
Buffalo	3.55c
Chicago	3.20c
Cincinnati	3.35c
Det., No. 14 and lighter	3.28½c
New York	3.42c
Philadelphia	3.30c
Pittsburgh	3.60c
Seattle	5.40c
St. Paul	3.75c

COLD FIN. STEEL	
Baltimore (c)	3.71c
Boston	4.00c-4.50c
Buffalo (h)	3.55c
Chattanooga*	4.06c
Chicago (h)	3.50c
Cincinnati	3.70c
Cleveland (h)	3.50c
Detroit	3.63½c
Los Ang.(f)(d)	5.95c
New Orleans	4.25c
New York	3.92c-4.42c
Philadelphia	3.73c
Pittsburgh(h)	3.45c
Portland (f)	4.75c
San Fran.(f)(d)	5.95c
Seattle (f)(d)	4.75c
St. Paul	3.20c
St. Louis	3.74c
Tulsa	4.65c

COLD ROLL. STRIP	
Boston, 0.100-in., 500 lb. lots	5.20c
Buffalo	5.25c
Chicago (b)	5.65c
Cincinnati	5.80c
Cleveland (b)	5.55c
Detroit	5.40c
Philadelphia	4.00c
New York	4.55c
St. Louis	5.74c

(b) Net base, straightening, cutting, boxing, 1 ton or more.
(c) Plus mill, size and quantity extras.
(d) Minus quant. diff.
(e) New mill classif.
(f) Rounds only.
(g) 50 bundles or over.
(h) Outside delivery, 10c less.

‡Domestic bars.
*Plus quan. extras.
**Under 25 bundles.
*†50 or more bundles.
†New extras apply.
††Base 40,000 lbs. extras on less.

Prices at Detroit, Cleveland, Chicago, Pittsburgh, Cincinnati, Chattanooga, New York, Boston, St. Louis on heavier lines are subject to new quantity differentials:

399 pounds and less, up 50 cents; 400 to 9999 pounds, base; 10,000 to 19,999 pounds, 15 cents under; 20,000 to 39,999 pounds, 25 cents under; 40,000 pounds and over, 35 cents under base.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, March 29

Export Prices f. o. b. Ship at Port of Dispatch—By Cable (or Radio)

	British gross tons U. K. ports		Continental Channel or North Sea ports, metric tons Gold parity, $4.8665	
PIG IRON	£ s d		£ s d	
Foundry, 2.50-3.00 Silicon	$15.00	2 18 6	$8.52	1 15 0
Basic bessemer	13.85	2 14 0*	7.30	1 10 0
Hematite, Phos. .03-.05	15.65	3 1 0	....	.....
SEMIFINISHED STEEL				
Billets	$28.22	5 10 0	$11.44	2 7 0
Wire rods, No. 5 gage	40.01	7 16 0	21.90	4 10 0
FINISHED STEEL				
Standard rails	$39.76	7 15 0	$26.77	5 10 0
Merchant bars	1.66c	7 5 0	.69c to .72c	3 2 6 to 3 5 0
Structural shapes	1.69c	7 7 6	.63c	2 17 6
Plates, †¼ in. or 5 mm.	1.83c	8 0 0	.91c	4 2 6
Sheets, black, 24 gage or 0.5 mm.	2.12c	9 5 0	1.27c to 1.29c	5 15 0 to 5 17 6
Sheets, gal., 24 gage, corr.	2.58c	11 5 0	1.43c	6 10 0
Bands and strips	1.89c	8 5 0	.88c	4 0 0
Plain wire, base	2.23c	9 15 0	1.18c	5 7 6
Galvanized wire, base	2.63c	11 10 0	1.38c to 1.40c	6 5 6 to 6 7 6
Wire nails, base	2.75c	12 0 0	1.27c	5 15 0
Tin plate, box 108 lbs.	$ 4.23	0 16 6	....	.....

British ferromanganese $85 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d 4($3.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

	£ s d		French Francs		Belgian Francs		Reich Marks	
Fdy. pig iron, Si. 2.5	$17.31	3 7 6(a)	$12.81	195	$13.75	295	$24.94	63
Basic bessemer pig iron	16.67	3 5 0(a)*	12.15	185	13.51	290	27.52 (b)	69.50
Furnace coke	4.49	0 17 6	7.88	120	5.12	110	7.62	19.25
Billets	28.22	5 10 0	28.25	430	20.50	440	38.21	96.50
Standard rails	1.89c	8 5 0	2.10c	700	2.31c	1,100	2.38c	132
Merchant bars	1.97c	8 12 0	1.68c	560	1.16c	550	1.98c	110
Structural shapes	2.00c	8 15 0	1.65c	550	1.16c	550	1.94c	107.50
Plates, †¼-in. or 5 mm.	2.03c	8 17 6	2.10c	700	1.47c	700	2.29c	127
Sheets, black	2.35c	10 5 0§	2.55c	850‡	1.63c	775‡	2.59c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	2.92c	12 15 0	4.50c	1,500	3.15c	1,500	6.60c	370
Plain wire	2.23c	9 15 0	3.39c	1,130	2.31c	1,100	3.11c	173
Bands and strips	2.40c	10 10 0	1.95c	650	1.47c	700	2.29c	127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel. (a) del. Middlesbrough. (b) hematite

Bars

Bar Prices, Page 54

Pittsburgh—Extent of the advance to be made this week in soft steel bars remains uncertain, but it was definitely confirmed late last week that the price will be raised from the present 1.75c, Pittsburgh, base. Alloy steel bar producers appear undetermined as to what course to take on the present 2.45c, Pittsburgh, market. Bar orders, especially from the automotive field, picked up last week.

Cleveland—Although the leading independent producer of steel bars here last week reduced ingot production, after operating its open hearths practically at capacity since the first week in February, its finishing mill schedules were unaltered. Demand for bars improved, with 70 per cent of the tonnage going to automotive interests, and miscellaneous requirements broadening. Contracting for second quarter has been stimulated by steel wage advances, indicative of higher prices. Good specifications have been received from the Pennsylvania railroad. Comparatively little tonnage due consumers on first quarter contracts was allowed to lapse.

Chicago—Soft steel bar specifications are well maintained, with some improvement noted. Automotive shipments have shown little change, while among all consumers a moderate gain in interest in second quarter requirements is seen. Second quarter contracts are being signed at 1.80c, Chicago, for soft steel bars; 1.70c for rail steel; and 1.60c, Terre Haute, Ind., for bar iron.

Boston—Crucible Steel Company of America at 4.47c, delivered, is low on 100 tons of nickel steel bars for the Springfield, Mass., armory. Commercial steel bar consumers are covering for second quarter after light specifications during recent weeks, with small tool makers leading the buying as a rule.

New York—Steel bar specifications are slightly more active, and consumers are contracting for second quarter more freely than since books were opened March 1. Oliver Iron & Steel Co., Pittsburgh, booked 1300 tons of tie rods for the Hudson river tunnel, Manhattan to Weehawken, N. J., through Mason & Hanger Co., general contractor.

Philadelphia — Commercial steel bar sellers expect second quarter contracting to exceed that for this quarter, in view of the fact that an advance may be announced next month. Railroad specifications, meanwhile, are furnishing mills with their best rollings. Prices are 1.75c, Pittsburgh or 2.04c, Philadelphia.

Plates

Plate Prices, Page 54

Pittsburgh — Several Pittsburgh district car builders last week purchased car plates for the Erie and Nickel Plate cars awarded in January. One is reported to have placed 2500 tons of plates for Erie cars. An advance in plates from 1.70c base, Pittsburgh, is expected to be announced this week. Because of the heavy movement of coal and the recent ice blockade in the Ohio river there is a scarcity of steel barges at Pittsburgh currently for shipment of steel products to southern ports. Government inquiry continues the only active pending barge work and Memphis, Tenn., engineers will close April 13 on 50 steel dredge pontoons and on April 5 for 64 dredge pontoons. About 1500 tons of plates will be required.

Cleveland—Practically all the leading railroads have taken bids on second quarter requirements of plates, shapes and bars and awards are expected shortly. Sales during the week showed little change from the level of recent weeks. Some producers noted an increase in inquiries, consumers appearing more anxious to contract.

Chicago—Plates have a better outlook, heavier demand from railroads being in early prospect, while tank fabricators report the best activity of the year. Texas Corp. has placed 500 tons for storage tanks in East Chicago, Ind. Diversion tunnels for the government dam at Fort Peck, Mont., will require 8000 tons of plates, while 1250 tons are pending for a syphon in Colorado.

Boston—Boiler shops in some instances are active, specifying more boiler plate steel. Miscellaneous buying of small lots continues fair. Plates are steady at 1.80c, Coatesville, Pa.

Philadelphia—Distribution of tonnage for seven coast guard cutters to be built in eastern navy yards is the most important pending plate business. Sellers report better contracting for second quarter, with likelihood of higher prices later having a stimulating influence. Meanwhile, the market is 1.80c, Coatesville, Pa., or 1.88½c, Philadelphia. Bids will be opened April 4 on boilers for the Reading, Pa., water department, with tank construction scheduled to come up later. Railroad equipment releases are expanding. The Pennsylvania railroad is expected to announce awards this week on a fair tonnage on which bids were opened March 26.

Contracts Placed

500 tons, gasoline storage tanks, East Chicago, Ind., for Texas Corp., to Graver Tank & Mfg. Corp., East Chicago, Ind.

Unstated tonnage, digester for Fibreboard Co. Inc., Port Angeles, Wash., to Chicago Bridge & Iron Works, Chicago.

Contracts Pending

8000 tons, diversion tunnels, Fort Peck, Mont., dam; bids April 1, to United States engineer, Kansas City, Mo.

1500 tons, plates and shapes, for Memphis, Tenn., engineers, for 64 dredge pontoons, each 48 x 18 x 2 feet 10 inches, and 7508 feet of steel dredge pipe in 27, 30 and 32-inch diameters, bids April 5; 50 steel dredge pontoons each 21 feet 2 inches x 7 x 3 feet, and 1000 feet of 18-inch steel pipe, bids April 13.

1250 tons, 8075 feet, 84-inch welded plate steel pipe, replacement, inlet works, Santa Maria reservoir, above Crede, Colo.; bids April 14 to Santa Maria Reservoir Co., Monte Vista, Colo.

270 tons, navy, bureau of supplies and accounts, Norfolk, Va., also 43 tons of structurals and 18 tons of bars; bids in.

Sheets

Sheet Prices, Page 54

Pittsburgh—Car sheets which the Pennsylvania railroad awarded recently in orders aggregating 3500 tons were largely copper-bearing and blue annealed grades. Over 2000 tons of the 3500 tons bought by the railroad came to Pittsburgh district producers. Pittsburgh prices hold at 1.75c for heavy hot-rolled; 2.25c for black sheets; and 2.85c for galvanized. Cold-rolled primes are 2.30c for No. 10 gage, and 2.75c for No. 20 gage. On No. 10 gage mill-run a price of 2.20c, Pittsburgh, applies April 6, this being a slight reduction.

Cleveland—Completion of first quarter contracts, and the desire of consumers in the automobile industry to take in all the material due them, sustained mill operations here and in adjacent lake district last week. Shipments have been practically unaffected by the labor uncertainties in the industry, and since the announcement of a wage increase by steel manufacturers effective April 1, many consumers have covered second quarter requirements. Mills have good backlogs for April, but last week specifications for shipment in the latter part of this month were lighter. Refrigerator manufactur-

ers continue to build up their schedules. Recently there has been a good demand for enameled sheets for gasoline filling stations.

Chicago—Sheet buyers are interested in obtaining protection on second quarter requirements as a result of the possibility of higher prices. Advances are expected to result from wage increases. Shipments are fairly steady but new business from the automotive industry recently was curtailed by the labor crisis. Demand from other consumers generally holds previous gains. Mill run No. 10 gage cold-finished sheets have been set at 2.30c, Gary, base, with ordinary cold-rolled material continuing 2.40c.

Boston—Sheet demand continues limited to occasional car lots. Some jobbers have covered for second quarter.

New York—With higher prices indicated in the near future there is more general disposition among consumers to contract for second quarter. Sellers are looking for increased movement of sheets into building construction, which normally is the principal outlet for sheets in this district. Electric refrigerator production is being stepped up rapidly, with an increase in the amount of special sheets required. Gamsu Steel Metal Works Inc., Bronx, has the subcontract for ventilating work on the new postoffice, requiring about 550 tons of sheets.

Philadelphia — With the possibility of a relatively early advance in sheets, consumers are contracting more freely for second quarter. In some quarters, an increase of $3 to $5 a ton is believed probable on certain grades.

Cincinnati—Sheet users are covering for second quarter. The principal mill in this district has announced a 10 per cent raise in wages and talk is heard of higher prices for sheets. Production is near 60 per cent of capacity.

St. Louis—Miscellaneous requirements continue to predominate here. Producers and distributors generally are well satisfied with conditions, each month so far this year showing increased volume.

Birmingham, Ala.—Sheet mill operations are well sustained and the market outlook is favorable.

Railroads

Track Material Prices, Page 55

Award of 113,021 tons of rails and fastenings during the past week, with 79,000 tons immediately pending, makes the rail market the most important in railroad buying. Tonnage placed includes 32,121 tons of rails and 12,000 tons of fastenings by the Erie and 30,000 tons by the Boston & Maine. New York Central has distributed 38,900 tons of rails to three interests and several thousand tons of fastenings to 17 makers.

Pending rail and fastening business includes 10,000 tons on which the Norfolk & Western will open bids April 13, 35,000 tons of rails and 14,000 tons of fastenings for which the Baltimore & Ohio has received PWA funds, and 20,000 tons of rails which the Great Northern is seeking.

Distribution of the 12,000 tons of fastenings by the Erie includes 8500 tons of tieplates, 1216 tons of screw spikes, 488 tons of spikes, 275 tons of bolts, 45,000 angle bars, about 900 tons, and 352,842 rail anchors, about 700 tons. Companies sharing in these awards include Republic Steel Corp., Youngstown Sheet & Tube Co., Carnegie Steel Co., Wheeling Steel Corp., Weirton Steel Co., Jones & Laughlin Steel Corp., Lamson & Sessions Co., Buffalo Bolt Co. and Sellers Mfg. Co.

Baltimore & Ohio has been awarded $4,500,000 for 35,000 tons of rails and 14,384 tons of tieplates, spikes and bolts, 292,000 anticreepers, 300,000 spring washers, 55,000 rail bonds and other accessories, and materials for repairs to 240 locomotives and 5000 freight cars.

Receiver for the Savannah & Atlanta has been awarded $250,000 by PWA for purchase of 100 new steel box cars. Chicago Great Western is seeking a PWA loan with which to buy 500 steel box cars.

New York Central will open bids April 13 on 3000 steel wheels, amounting to about 1000 tons.

Dominion Steel & Coal Corp., Sydney, N. S., has increased its working force 15 per cent to complete an order for 4000 tons of rails for the Canadian Pacific. The rails will be shipped by water to Vancouver, B. C.

Rail Orders Placed

New York Central, 38,900 tons, distributed as follows: Bethlehem Steel Co., 19,510 tons, Illinois Steel Co. 17,490 tons, Carnegie Steel Co. 1900 tons; several thousand tons of accessories divided among 17 suppliers.

Erie, 32,121 tons rails, and 12,000 tons fastenings; Carnegie Steel Co., 17,512 tons of rails; Illinois Steel Co., 5857 tons; Bethlehem Steel Co., 4618 tons; Inland Steel Co., 2000 tons; all first quality; 2134 tons second quality rails prorated to same makers. Fastenings to various producers.

Boston & Maine, 30,000 tons, rails and fastenings, to Bethlehem Steel Co., Bethlehem, Pa.

Car Orders Placed

Erie, eight combination baggage and mail cars to American Car & Foundry Co., New York.

Locomotives Placed

Navy, bureau of supplies and accounts, Washington, two switching locomotives for Mare Island, Calif., to American Locomotive Co., Dunkirk, N. Y.

United States engineer, Glasgow, Mich., one 25-ton gasoline-powered locomotive to Fate-Root-Heath Co., Plymouth, O.

Car Orders Pending

Chicago Great Western, 500 steel box cars; PWA loan sought.

Navy department, bureau of supplies and accounts, Washington, two box and three flat cars; Haffner-Thrall Car Co., Chicago, low.

Seaboard Air Line, 1000 fifty-ton steel box; bids asked.

Locomotives Pending

Chief of engineers, army, Washington, one 8-ton gasoline mechanical drive locomotive; bids in.

Navy department, bureau of supplies and accounts, Washington, two standard gage gasoline-operated locomotives, Mountain View, Calif.; bids April 10.

Rail Orders Pending

Norfolk & Western, 10,000 tons; bids April 13.

United States engineer, Chicago, 165 tons, 60-pound relaying rails, 33-foot; bids April 3.

Strip Steel

Strip Prices, Page 55

Pittsburgh — Heavier demand for cold-rolled strip steel is evident, with buying coming chiefly from hardware, specialty and miscellaneous manufacturers. Present Pittsburgh base prices of 1.75c on hot-rolled strip and 2.40c on cold-rolled strip may advance soon. A feature bearing on the cold-rolled strip market last week was announcement that cold-finished mill-run 10 gage sheets would be reduced to 2.20c, Pittsburgh, effective April 6.

Chicago — Strip steel shipments hold around recent rates with consumers more active in obtaining protection on second quarter needs. Automotive deliveries are fairly well maintained but new business from this source recently has been light. Second quarter contracting is being done at 1.85c, Chicago, for hot strip and 2.40c, Pittsburgh-Cleveland, for cold-rolled strip.

Cleveland—Except in a few isolated instances, consumers have not permitted tonnage due them on first quarter contracts to lapse, and considerably more interest is manifest

in contracting for second quarter, due to prospects for steel price advances in that period. The full benefit of the labor settlement in the automobile industry was not felt last week, as specifications were not as heavy as two or three weeks ago. However, orders are expected to pick up again shortly. Little tonnage is developing from other sources than automotive.

Boston — Demand for cold-rolled strip has improved slowly, but still lags behind round wires. Hot-rolled is being specified cautiously. Cold-rolled strip is steady at 2.60c, Worcester.

New York—While far from active, strip business is improving. Hot-rolled strip is 2.08c, New York, and cold-rolled strip, 2.73c, New York.

Philadelphia—Contracting in strip has improved as indications of higher prices became more apparent. Meanwhile, the market is 1.75c, Pittsburgh, or 2.04c, Philadelphia, for hot strip, and 2.40c, Pittsburgh, or 2.69c, Philadelphia, for cold strip.

Wire

Wire Prices, Page 55

Pittsburgh—Wire producers will consider a price increase in rods, nails and plain wire this week, in spite of low demand and overstocked condition of jobbers. In addition, foreign nails and fence are making their inroads into American markets. Current prices are 2.35c, Pittsburgh, base on nails, 2.20c on plain wire and $36 on rods.

Cleveland—A larger number of specifications for wire were received here than in the week preceding, but total tonnage was down slightly. Some hesitation still is ascribed to labor uncertainties at consuming plants. It is generally believed, however, that with settlement of the automotive situation business from this source will improve. About 50 per cent of consumers in this district have placed contracts for second quarter, and the trend toward definite commitments has been accelerated by prospects of advances in steel prices.

Chicago—Wire shipments are fairly steady and heavier than during February. Automotive requirements are well maintained and interruption by the labor controversy is expected to be compensated. Interest in second quarter contracting is active.

Boston—Improvement is noted in demand for wire. Increase in buying has been moderate, but in some instances enough to put drawing operations on a more uniform schedule.

Philadelphia—Nails and wire products are moving somewhat more freely into consumption, although unfavorable weather has undoubtedly had a deterring effect on outside operations.

Tin Plate

Tin Plate Prices, Page 54

New York—Tin plate releases are brisk. Trade leaders look for production this year to exceed that of 1933, which amounted to 1,673,962 gross tons, which compared with 984,050 tons in 1932 and 1,800,007 tons in 1929.

Pittsburgh—The tin plate operating rate last week was advanced fractionally to 80 per cent. Canmakers still are issuing heavy specifications, indicating an even rate of shipments through April. Demand for tin mill specialties continues in fair volume. Standard tin plate holds at $5.25 per base box.

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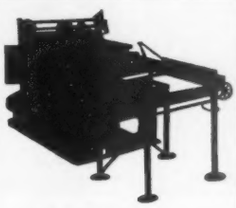

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Shapes

Structural Shape Prices, Page 54

Pittsburgh—This week an advance in structural shapes is scheduled to be announced from the present 1.70c, Pittsburgh, base, and although the extent is not as yet known it likely will be at least $2 a ton to recompense steel producers for advancing costs, including the recent 10 per cent wage increase. General structural inquiry is led by a 3600-ton bridge in Oregon, bids April 26, as well as several thousand tons for highway bridges in mid-western locations.

Cleveland—Consideration is being given by the state highway commission to rebuilding the Lorain street bridge over Rocky River, in Cuyahoga county, which may require several thousand tons of shapes. Public work is not developing as well as expected; the latest state highway letting set for April 6 and 7 taking little steel, and practically no shapes. A few small commercial jobs in Cleveland are being figured. A fabricating interest here booked 300 tons for a bridge at Paintsville, Ky.

Chicago—Illinois takes bids during the coming two weeks on highway bridges requiring 5250 tons, recently having closed bids on six structures requiring 600 tons. Bridge inquiries in other states will take about 2700 tons. Awards amount to only 2500 tons, being headed by 800 tons for a department store addition here.

Boston—Structural steel is more active, close to 1600 tons being placed, including foundations for the Boston parcel post substructure. The railroad bridge, 6000 tons, over the Cape Cod canal is expected out in about two weeks, while early approval of the Northern avenue bridge, Boston, taking several thousand tons, is indicated.

New York—Structural steel contracts have dropped following the recent mild flurry. Several of the largest projects in the district continue to be delayed. About 800 tons will be placed this week for a Sheffield Farms building, Brooklyn, N. Y. James C. Dempsey, Philadelphia, is low on field inspection of structural steel, about 12,300 tons, for the midtown postoffice annex, New York.

Philadelphia—Placing of approximately 1200 tons for the Richmond street power house of the Philadelphia Electric Co. features structural activity here. Bids will be opened this week on the first section of the Camden approach to the high speed line over the Delaware river bridge, substantial tonnages of shapes, piling and bars being required. Shapes continue 1.80c, Bethlehem, or 1.90½c, Philadelphia.

Contracts Placed

1200 tons, Richmond street power house, Philadelphia Electric Co., Philadelphia, to Belmont Iron Works, Philadelphia.

950 tons, substructure, parcel post building, Boston, to New England Structural Steel Co., Everett, Mass.; C. J. Meany Co. and New England Foundation Co., Boston, general contractors.

800 tons, Davis Co. store addition, Chicago, to Hansell-Elcock Co., Chicago.

675 tons, Iowa highway bridges; 450 tons to Des Moines Steel Co., Des Moines, Iowa; 225 tons to Pittsburgh-Des Moines Steel Co., Pittsburgh.

600 tons, swing span, Apalachicola Bay bridge, Franklin county, Florida, to Nashville Bridge Co., Nashville, Tenn.

500 tons, brick shed, Chicago, to New City Iron Works Inc., Chicago.

465 tons, second laboratory unit and administration building, Saratoga Spa, New York, to New York Steel Corp.; Edward Corning Co., New York, general contractor.

413 tons, through steel truss bridge, Dunkark and Monongahela townships, Greene county, Pennsylvania, to Jones & Laughlin Steel Corp., Pittsburgh; through Tri-State Engineering Co., Waynesburg, Pa. Jones & Laughlin Steel Corp. also awarded 51 tons of plain steel bars for the same project.

400 tons high tensile shapes, for Philadelphia and Brooklyn navy yards, on schedule 900-7391; 250 tons to Carnegie Steel Co., Pittsburgh; 150 tons to Bethlehem Steel Co., Bethlehem, Pa.

400 tons, building addition, Proximity Mills, Proximity, N. C., to Carolina Steel & Iron Co., Greensboro, N. C.

300 tons, soaking pit building, South Works, American Steel & Wire Co., Worcester, Mass., to American Bridge Co., Pittsburgh.

300 tons, state bridge, Paintsville, Johnson county, Kentucky, to McClintic-Marshall Corp., Bethlehem, Pa.

290 tons, buildings at state hospital, King's Park, N. Y., to Klein Iron Works, New York; through George Colon Construction Co.

275 tons, postoffice, Holyoke, Mass., to Haarmann Steel Co., Holyoke, Mass.; Tremaglio Bros., Waterbury, Conn., general contractors.

225 tons, plant addition, Louisville, to McClintic-Marshall Corp., Bethlehem, Pa.

225 tons, bridge repairs, St. Paul, to Minneapolis-Moline Power Implement Co., Minneapolis.

Shape Awards Compared

	Tons
Week ended March 31	11,138
*Week ended March 24	25,179
Week ended March 17	21,533
This week in 1933	21,594
Weekly average for 1933	15,413
Weekly average 1934	16,635
Weekly average, March	18,349
Total to date 1933	144,911
Total to date 1934	232,894

*Revised

220 tons, bridge repairs and construction of a through truss 184-foot 6-inch span, bridge No. 2318, Wheatland, Pa., to McClintic-Marshall Corp., Bethlehem, Pa.; through Johnston & McIntyre, Sharon, Pa.

216 tons, employes' building, state hospital Dorchester district, Boston, including 158 tons of structurals to Boston Structural Steel Co. and 58 tons, bar joists, to Concrete Steel Co., Boston; Thomas O'Connor & Co., Cambridge, Mass., general contractor.

210 tons, building, Stickney, Ill., to New City Iron Works, Chicago.

200 tons, state highway bridge, Merrimas street, Newburyport, Mass., to Boston Bridge Works, Cambridge, Mass.; Arute Bros. Inc., Bridgewater, Mass., general contractors.

200 tons, batch bins, Sheffield, Ala., to Stupp Bros. Bridge & Iron Co., St. Louis.

185 tons, addition, gear and axle building, Chevrolet Motor Co., Detroit, to Whitehead & Kales Co., Detroit.

179 tons, 873-foot pony truss bridge, Everett borough, Bedford county, Pennsylvania, to Fort Pitt Bridge Works, Pittsburgh; through J. G. King, Altoona, Pa.; Truscon Steel Co. awarded 25 tons of plain steel bars.

175 tons, bridge SB-121, section 9C, Jackson county, Illinois, to St. Louis Structural Steel Co., St. Louis.

175 tons, state highway bridge, Trumbull, Conn., to American Bridge Co., Pittsburgh; through Mariani Construction Co.

170 tons, warehouse, Cedar Rapids, Iowa, for Quaker Oats Co., to Iowa Steel & Iron Works, Cedar Rapids, Iowa.

165 tons, buildings, Aberdeen, Md., to Reading Steel Products Co., Reading Pa.

150 tons, belt conveyor gallery and concrete mixing plant, Norris dam, Tennessee Valley Authority, Knoxville, Tenn., to Stupp Bros. Bridge & Iron Co., St. Louis.

150 tons, state highway bridge, Roanoke, Va., to Virginia Bridge & Iron Co., Roanoke, Va.

145 tons, bridge, Ronceverte, W. Va., to Pittsburgh Bridge & Iron Works, Rochester, Pa.

140 tons, building for I. E. du Pont de Nemours Inc., Carney's Point, Pa., to McClintic-Marshall Corp., Bethlehem, Pa.

120 tons, school Smyrna, Del., to Reading Steel Products Co., Reading, Pa.; this was previously reported as going to another fabricator.

115 tons, school, Claymont, Del., to McClintic-Marshall Corp., Bethlehem, Pa.

100 tons, approximately, reconstruction bridge No. 2313, Silver street, Sharon, Pa., to Reliance Steel Products Co. Inc., Rankin, Pa., at $9090; through Mercer county commissioners.

100 tons, seaplane hangar for coast guard, Winter Island, Salem, Mass.; 95 tons, shapes, to Lehigh Structural Steel Co., Allenton, Pa., and five tons, bars, to Truscon Steel Co., Youngstown, O.; Marden Construction Co., Boston, general contractor.

Unstated tonnage, spud frames, sheaves and sheave brackets, four dredges, United States engineer, Kansas City, Mo., to R. W. Kaltenbach Corp., Bedford, O., $12,300.

Contracts Pending

5250 tons, various Illinois state highway bridges; bids April 3 on 2800

tons; April 11 on 2450 tons.
3970 tons, Coos bay bridge, Oregon; bids at Portland, Oreg., April 26.
2465 tons, medium, black and galvanized, coast guard cutters, delivery Brooklyn, Philadelphia and Charleston, S. C.; bids April 6, bureau of supplies and accounts, navy, Washington, schedule 2052.
2105 tons, Yaquina bay bridge, Oregon; bids at Portland, Oreg., May 17.
1900 tons, state bridge, Forest county, Pennsylvania; bids April 13.
1800 tons, mill buildings for Wheeling Steel Corp., Yorkville, O.; readvertised. Reported last week as placed with Wheeling Structural Steel Co., Wheeling, W. Va.
1200 tons, Douglas bridge, Juneau, Alaska; bids soon by Alaska Road commission, Juneau.
1000 tons, piling, Cape May, N. J., Canuso Contracting Co., Philadelphia, general contractor; this project originally called for 1500 tons, but bids exceeded appropriation with a result that the amount of the work was reduced to the amount of money available.
1000 tons, federal warehouse extension, treasury department, Washington, estimated cost $1,700,000; bids April 10.
900 tons, eight Texas highway bridges.
850 tons, Anacosta river bridge, near Washington; bids opened by the Pennsylvania railroad last week.
725 tons, Umpqua river bridge, Oregon; bids at Portland, Oreg., June 7.
675 tons, including shapes, girder plates and machinery, double leaf bascule span, Campostella bridge, Norfolk, Va.; Wisconsin Bridge & Iron Co., North Milwaukee, Wis., low.
650 tons, Wisconsin highway bridges; Eau Claire Engineering Co., Eau Claire, Wis., low on general contract.
600 tons, nitrate plant, Florence, Ala.
600 tons, bridge superstructure, Boston & Albany railroad, West Newton, Mass.; bids in.
500 tons, bridge, Stuttgart, Ark.
500 tons, recreational building, Hibbing, Minn.
450 tons, dormitory buildings, University of West Virginia, Morgantown, W. Va.
430 tons, four highway bridges, Connecticut.
356 tons, piling, widening of American river bridge, Sacramento county, California, for state; general contract to Lord & Bishop, Oroville, Calif.
370 tons, state highway bridges, Virginia.
350 tons, four Minnesota highway bridges.
309 tons, Siuslas river bridge, Oregon; bids at Portland, Oreg., June 7.
285 tons, bridge, Hall Station, Md.
250 tons, grain elevator, Chicago.
244 tons, state crossing in Grand county, Colorado; bids April 3.
208 tons, through truss bridge, McHenry township, Lycoming county, Pa.; bids April 13; included 33 tons of plain steel bars.
200 tons, Museum of Fine Arts, Richmond, Va.
200 tons, buildings, boat basin, wharf, etc., at United States quarantine station, Port Townsend, Wash.
200 tons, bridge, High Island, Tex.
154 tons, state highway work and bridges in Lincoln, Bent and Garfield counties, Colorado; bids opened.
150 tons, dormitory, State college, Amherst, Mass.
125 tons, postoffice, White River Junction, Vt.
120 tons, state underpass, Unita county, Wyoming; bids March 28.

Reinforcing

Reinforcing Bar Prices, Page 55

Pittsburgh—Truscon Steel Co., Youngstown, O., is reported to have been awarded approximately 6000 tons of plain steel reinforcing bars for construction at Boulder dam, on which Sheffield Steel Corp. recently was reported low. The latter mill is understood to have booked about 200 tons, there having been some dispute over the method of computing the delivered price to Boulder dam. An advance in plain steel bars for reinforcing purposes from the present 1.90c base, Pittsburgh, for cut lengths, probably will be announced this week.

Cleveland—One of the largest pending public projects in Ohio, for water and sanitation at Columbus, O., which requires 3000 tons of concrete bars and about 600 tons of

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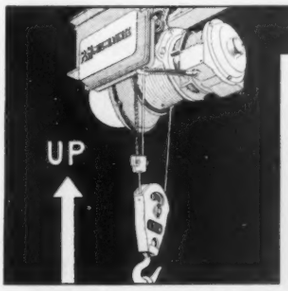
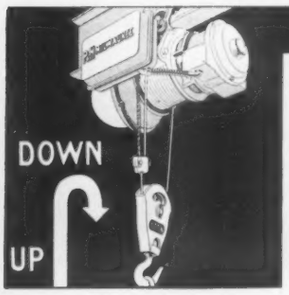
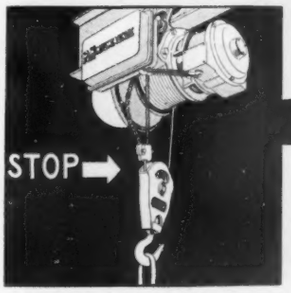


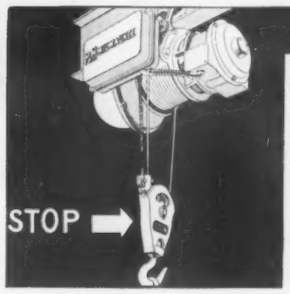
The bottom block is coming up to the weight which controls the P & H limit switch.



If the load has been hoisted so fast that the load block "drifts" after the current is shut off, the limit switch momentarily opens a lowering switch, dropping the load just enough to avoid danger.



As it contacts the weight, current is shut off and the hoist stops.



If the limit switch weight should become disconnected in any way, current is automatically shut off until the weight is properly attached.

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Cast steel suspension members.
Weight operated reversing limit switch.
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Drop forged trolley wheels.

There's a P & H-Milwaukee for every application. Mountings are interchangeable. Speeds and lifts in accordance with your needs. Our hoist engineers will be glad to recommend the most economical unit for your plant.

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plates for tunnel liners has been held up by a taxpayers' suit. Ohio state highway projects on which bids are to be taken at Columbus, April 6 and 7, call for less than 100 tons of bars. Both public and private work is slow.

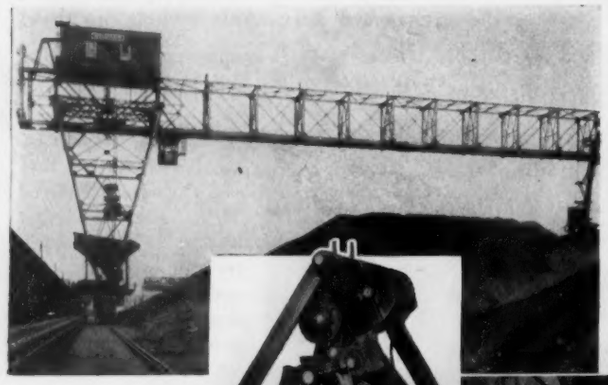
Chicago—Concrete bar orders are light and except for highway construction and Chicago sanitary district work few large lots are pending in this district. Bids have been opened on about 1000 tons for Illinois highway work, but orders have yet to be distributed. Reinforcing bars continue 1.95c for billet bars, and 1.80c for rail steel.

Boston—Additional small bridge and highway projects are active in Rhode Island and Connecticut, but the largest volume of reinforcing bars in New England is required for state hospital and prison projects in Massachusetts. Sales in small lots have improved slightly.

Philadelphia—Except 775 tons for two projects in Washington, reinforcing bar buying has been confined to small, scattered lots. Road work is expanding, but orders have come through slowly. Billet steel bars in cut lengths are 2.19c, Philadelphia.

Birmingham, Ala.—Reduction in new billet steel bars for reinforcing purposes to 2.00c, Gulf ports, effective April 6, and in rail steel bars for the same use to 1.95c, Gulf ports, likely will be withdrawn. A Texas producer filed these prices last week.

•FROM ORE MINE TO FINISHED PRODUCT... *machinery for iron and steel production*



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Contracts Placed

6000 tons, Bouler dam projects, bids of March 16 and Feb. 23, reported to Truscon Steel Co., Youngstown, O. Sheffield Steel Corp., Kansas City, Mo., previously reported low.

1900 tons, sewer leading to Anacosta river, District of Columbia, reported placed with Hudson Supply & Equipment Co.

868 tons, CWA project No. 581, Arroyo de los Jardine drainage district, Los Angeles, to unnamed interests.

850 tons, Hudson river midtown tunnel, Manhattan- Weehawken, N. J., to Carnegie Steel Co., Pittsburgh; Mason & Hangar Co., New York, general contractor.

560 tons, axle steel bars, state hospital, Pine Aire station, New York, to National Bridge Co., Long Island City, N. Y.; Turner Construction Co., New York, general contractor.

500 tons, Calvert street bridge, for the District of Columbia commission, Washington, to the Hudson Supply Co., Washington, with steel to be supplied by the Bethlehem Steel Co., Bethlehem, Pa.

275 tons, Woodrow Wilson high school additions, Washington, reported placed through McCloskey & Co., Philadelphia, general contractors, with the Sweets Steel Co., Williamsport, Pa.; 660 tons of shapes have not as yet been reported placed.

209 tons, bridge for Seaboard Air Line, Cox road, Petersburg, Va., to Virginia Steel Co., Richmond, Va.; through Ruffin Construction Co., Richmond, Va.

200 tons, several Pennsylvania highway projects, to American Steel & Wire Co., New York.

200 tons, Beechnut Packing Co., Rochester, N. Y., to Truscon Steel Co., Youngstown, O.

200 tons, state highway bridge, Connecticut, to unstated fabricator; Mariani Construction Co., general contractor.

Concrete Awards Compared

	Tons
Week ended March 31	12,405
Week ended March 24	4,391
Week ended March 17	4,483
This week in 1933	1,842
Weekly average for 1933	3,771
Weekly average 1934	4,696
Weekly average March	6,313
Total to date 1933	48,704
Total to date 1934	65,744

200 tons, dormitories, prison colony, Norfolk, Mass., to Truscon Steel Co., Youngstown, O. Additional tonnage to be placed for other buildings.
175 tons, mesh, highway No. 29, section 12B, Somerset county, New Jersey, to American Steel & Wire Co., New York. Joints and bars to Igoe Bros., Newark, N. J.; through Weldon Construction Co.
150 tons, Panama, to Kilby Car & Foundry Co., Anniston, Ala.; bids March 19, schedule 2948.
150 tons, bureau of roads bridge, Rainier national park, Washington, to unnamed eastern mill; Western Construction Co., Seattle, general contractor.
118 tons, state highway work in Tulare county, California, to Soule Steel Co., San Francisco.

Contracts Pending

1804 tons, Coos bay bridge, Oregon; bids at Portland, Oreg., April 26.
1125 tons, Yaquina bay bridge, Oregon; bids at Portland, Oreg., May 17.
650 tons, Umpqua river bridge, Oregon; bids at Portland, Oreg., June 7.
600 tons, state highways and bridges, Massachusetts; bids April 10.
525 tons, Siuslaw river bridge, Oregon; bids at Portland, Oreg., June 7.
300 tons, school, Buffalo; bids in.
260 tons, El Capitan dam reservoir, San Diego, Calif.; bids April 9.
250 tons, sewer for Lexington, Ky.
230 tons for internal revenue building extension, Washington; rail steel bars specified.
219 tons, two reinforced concrete structures, and 5050 feet of reinforced concrete pavement 20 feet wide, Hanover township, Luzerne county, Pennsylvania; W. Grant Raub, Red Lion, Pa., low at $272,620.92 on bids of March 23.
216 tons, widening American river bridge, Sacramento county, California, for state; general contract to Lord & Bishop, Oroville, Calif.
186 tons, state highway work in Huerfana county, Colorado; bids March 29.
117 tons, state crossing in Los Angeles county, California; general contract to J. L. McClain, Los Angeles.
110 tons, state crossing in Grand county, Colorado; bids April 3.

Pipe

Pipe Prices, Page 55

Pittsburgh—Bids of March 17 to Pittsburgh federal engineers on 21,000 feet of ½ to 4-inch welded steel pipe were withdrawn and the tonnage is being readvertised for March 31. One Pittsburgh pipe mill last week received an order for about 100 tons of boiler tubes required for five new locomotives being built by an eastern interest. Bids on conduit pipe in an unstated amount will be closed by Pittsburgh federal engineers April 10 for extensive improvements to approaches on lock No. 4. Memphis, Tenn., engineers are asking bids on 7508 feet of 27, 30 and 32-inch dredge pipe, April 5, and 1000 feet of 18-inch steel pipe April 13. Pittsburgh pipe mills report considerably heavier demand for oil country goods.

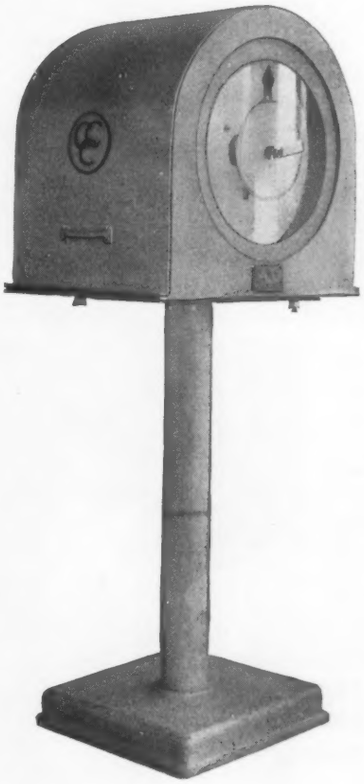
Chicago—Cast pipe orders are light and releases against old contracts are slow. Delays in obtaining government approval of loans are responsible for practically all of the hold-ups; little improvement is anticipated until late spring or early summer. New inquiries are light with orders usually involving small lots.

Boston—Outlook for small steel pipe demand has improved with several fair size contracts placed for state hospital and other buildings. Cast pipe buying holds fairly well with miscellaneous buying and an improved outlook as the period for outdoor work arrives.

New York—Cast pipe inquiry is heavier. A large tonnage, mostly 24-inch, for Saratoga Springs, N. Y., is expected out soon. Rochester, N. Y., is buying close to 1500 tons of 6-inch while numerous small lots have been

CLARK

AUTOMATIC SHEET MEASURING DEVICE



For use in any sheet or tin mill using automatic roller and catching tables and can be applied to existing installations without modification of such installations.

After the sheet passes through rolls it automatically gives an accurate indication of length of sheet by movement of pointer on an illuminated dial which may be calibrated to read directly in inches. Position of pointer is maintained while the sheet is taken back over top of rolls and until it starts through the next pass giving operator ample time to note definitely the length and set his rolls accordingly.

During next pass pointer moves from previous position to new position again indicating length of sheet after the latest pass. This operation is repeated until required length of sheet is obtained. The next piece as delivered from furnace automatically resets the pointer to indicate lengths, making it possible for the operator to know definitely the length of the sheet after each pass.

THE CLARK CONTROLLER CO.
1146 East 152nd St.
Cleveland, Ohio

bid for relief projects. A New Jersey utility is inquiring for 350 tons for gas line use.

Cast Pipe Placed

210 tons, small sizes, state hospital, Oneonta, N. Y., to Donaldson Iron Works, Emaus, Pa.

900 tons, 24-inch, Wilmette, Ill., to Lynchburg Foundry Co., Lynchburg, Va.

225 tons, 12-inch, Cook county, Ill., infirmary, to Lynchburg Foundry Co., Lynchburg, Va., in addition to 1000 tons previously reported.

119 tons, 4-inch, class 150, Oakland, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

Cast Pipe Pending

1500 tons, 6-inch, Rochester, N. Y.

350 tons, 4, 6 and 8-inch for gas line, Public Service Corp. of New Jersey.

Unstated tonnage, 31,000 feet of 36-inch, 16,100 feet of 30-inch, 6400 feet of 24-inch and 3600 feet of 18-inch, water supply improvement, Miami, Fla.; bids April 18, William Sydow, director of public works.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 55

Specifications for bolts, nuts and rivets are heavier from railroads, automotive consumers and farm implement builders. Increasing demands from railroads are expected this week, for carbuilding needs. Miscellaneous users are buying more freely.

Contracts for second quarter have been completed by nearly all consumers in the Pittsburgh and Cleveland districts. At Chicago contracting is increasing in volume.

Established prices remain steady at 70 off for bolts and nuts, 70 and 10 off for small rivets and 2.75c, Pittsburgh, and 2.85c, Chicago, for large rivets.

Pig Iron

Pig Iron Prices, Page 56

Pittsburgh—Buying still is of nominal proportions and although there is some possibility of a price advance this is not taken seriously by most melters with the result that there is no forward buying. Foundries here on recent car casting orders are buying pig iron only in 50 and 100-ton lots.

Cleveland—Wage advances, with reduction in working hours, in the bituminous coal fields will raise pig iron producers' costs, and consideration is being given to advancing prices, though no action has been taken thus far. In the meantime, contracting for second quarter has proceeded at a more rapid rate. A leading lake merchant furnace interest in March booked 100,000 tons. This producer recently increased production, and is contemplating lighting another blast furnace. Shipments in March were approximately 40 per cent above February, and contract requirements call for still heavier shipments in April, though the percentage gain is not expected to be as large as in March. Automotive and railroad foundries have stepped up consumption.

Chicago—Higher prices in the near future are suggested strongly by recent increases in costs resulting from wage advances at coal and ore mines and at iron producing plants. Buyers have been more active recently in contracting for second quarter needs, and sales for that period are considerably heavier than were those for first quarter. March shipments were the heaviest so far this year and 35 to 40 per cent ahead of February deliveries. Improvements in foundry schedules continue, with pig iron deliveries to automotive plants well sustained.

Boston—Buying and inquiry is light following the closing of several recent inquiries, including 600 tons of malleable. Purchasing against these inquiries was well spread. Recent arrivals included 400 tons of Indian iron. Dutch iron storage at Providence, R. I., is moving in small lots at prices slightly under the domestic quotations.

New York—Consumers are manifesting better interest but are still buying sparingly. Possible price advances later may spur activity. Bids will be opened April 10 on 89 tons of foundry iron for the Brooklyn navy yard.

Philadelphia — Shipments this month will show a substantial increase in the daily rate, according to leading sellers. Improved volume of new buying also is indicated, although few large orders have been noted to date. Possibility of higher prices as a result of higher wage rates is already stimulating contracting for second quarter. Prices on some brands of foreign pig iron continue under the domestic market, it appears. Recent importations totaled approximately 5000 tons, with the bulk from Holland.

Buffalo—Sales here during March are believed to have been greater than those for any month since June, 1930. Shipments from both local and seaboard stocks have been heavy.

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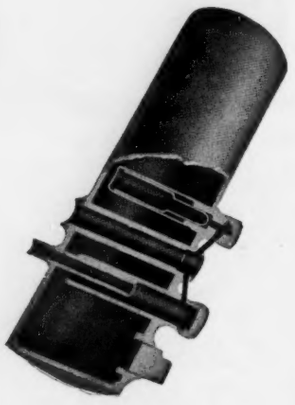

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An inquiry for 1000 tons for central New York still is pending. A blast furnace in this district which had been set for withdrawal from production on April 1 will be kept in blast indefinitely.

Cincinnati—Second quarter contracting is light, with the stove and automotive needs accounting for the bulk of the melt. Hamilton Coke & Iron Co., operating one blast furnace and by-product coke ovens, has announced 10 per cent advance in wages.

St. Louis—Buying continues active and shipments are maintaining a high level, with the March total substantially higher than in February. Higher costs are seen boosting current price levels. Consumers stocks are being depleted rapidly.

Birmingham, Ala.—Stove and jobbing foundries continue to buy in limited quantities.

Toronto, Ont. — Production has been curtailed sharply with the blowing out of furnaces at Hamilton and Port Colborne, Ont., and the banking of the stack at Sydney, N. S. At present only one furnace is blowing, that at Sault Ste. Marie, Ont.

Ferroalloys

Ferroalloy Prices, Page 56

Improvement is noted in spiegeleisen and ferromanganese demand, with steel producers planning to step up operations. Domestic spiegeleisen, 19 to 21 per cent, is $26, furnace, for spot shipment and ferromanganese, $85, duty paid, eastern seaboard, this latter price having been reaffirmed recently for second quarter. One lot of about 400 tons of off-grade ferromanganse, high in phosphorus and manganese, is actively in the Pittsburgh district. The first tow of water-delivered fluorspar to come into the Pittsburgh district this season arrived at a Pittsburgh steel mill late last week. About 1000 tons of fluorspar from southern Indiana constitute the shipment. Domestic fluorspar prices have been advanced 50 cents a ton.

Semifinished

Semifinished Prices, Page 55

Although not definitely confirmed, it appeared propable late last week that sheet bars, billets and slabs probably will be advanced $3 or $4 a ton, skelp by the same amount, and wire rods $1 or $2 a ton. Some producers intend to determine early this week the extent of advances on semifinished material, due to increased labor costs.

Scrap

Scrap Prices, Page 57

Pittsburgh—Scrap interests expect several consuming mills will require scrap soon. No. 1 heavy melting steel, while still quoted $14 to $14.50, shows a firmer tone and the same is true of other grades. The Pennsylvania will close April 4 on a list containing 5375 tons of car wheels, 3515 tons of scrap rails, 3450 tons of No. 1 heavy melting steel, and 2500 tons of uncut structural steel. Although the Seaboard Air Line closed recently on 19,000 tons of scrap, including 7000 tons of heavy steel scrap and 4000 tons of car wheels, it is understood that most of the material went for export.

Cleveland—Renewed buying of steel and iron scrap is expected here and in the valleys, as open-hearth consumption continues heavy. Prices are steady and recent buying has been at the market. Shipments on contract have not been interrupted.

Chicago—Heavy melting steel has lost another 25 cents to $11.50 to $12, and most grades are off 50 cents from recent peaks. Weakness has been caused principally by excess supplies, demand being fairly active. Several mills now have covered requirements four to six weeks ahead, but additional buying is expected from others. In the meantime offerings are sufficient to exert a depressing influence on prices.

Boston—Dullness in the scrap market is accompanied by weakness in prices of several grades, notably machine shop turnings. New England consumers of melting steel are marking time.

New York—Scrap prices are unchanged, but steadier. Several eastern steel works, including Bridgeport, Conn., and Coatesville, Pa., are taking shipments against contracts but there has been little new buying. Some barge buying is being done for shipment to Buffalo and Sparrows Point, Md.

Philadelphia—Reflecting an easier tendency throughout the East generally is a 50-cent reduction by the Bethlehem Steel Co. in its f.o.b. Baltimore price for No. 1 melting steel, this price now being $10. This interest has also reduced its price at

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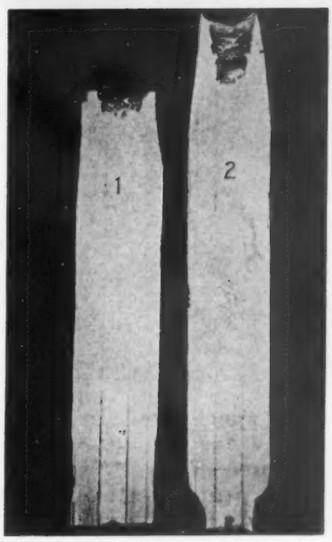

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Johnstown, Pa., picking up a little No. 1 steel recently at $12.50, delivered that point. This was the first buying there in recent weeks and it indicates a drop of about $2 a ton from the peak established in February.

Buffalo—Purchases of scrap have dropped sharply. Mills have reduced their offers about 50 cents for some grades but dealers will not sell. Large shipments are being made on orders. Recent sales of some specialties have established the best prices of the year.

Detroit—The price tendency in scrap continues downward due to continued heavy offerings by automobile plants and by reluctance of consumers to buy. For the next few weeks dealers believe weakness will predominate. This week cast borings, mixed borings and turnings, No. 2 busheling, No. 1 machinery cast, forge flashings, loose sheet clippings and turnings are reduced. General Motors closed March 30 on almost 300 cars of various grades.

St. Louis—Iron and steel scrap has eased further though quotation changes have been mainly adjustments. Business has been limited, mainly because sellers, both originators of material and dealers, are slow to sell at the offers by melters.

Cincinnati—Heavy melting steel and other items of iron and steel scrap are lower. The Valley outlet has been clogged and mills show no disposition to buy. Collections of country scrap are heavier.

Birmingham, Ala.—Lagging conditions are still reported in iron and steel scrap though April is expected to give an upward turn. Quotations are practically unchanged with little weakness noticeable. Old material is available.

Toronto, Ont.—Trading in iron and steel scrap has tapered, with demand confined to small lots of special grades. Steel scrap is dull and shipments to the Hamilton district have been suspended. Iron scrap has a fair call from foundries and such lines as machinery cast and wrought scrap are in demand, while stove plate and malleable are spotty and other lines dull.

Coke By-Products

Coke By-Product Prices, Page 55

New York — Naphthalene shipments to retail and jobbing distributors are heavier. Prices are unchanged at 6.00c a pound, for flakes and balls in barrel lots. Little change in distillate prices is expected for second quarter by distributors. Demand for toluol and benzol is steady.

Warehouse

Warehouse Prices, Page 58

Pittsburgh — Out-of-town deliveries of steel products from Pittsburgh warehouses made relatively the better showing in March. In total, March was comparable with February but did not show material improvement.

Chicago—Sales are holding recent gains and equal preceding weeks of this month. March business will be slightly ahead of the February rate and considerably larger than a year ago.

Boston—Improvement in warehouse sales during the last week has been more pronounced in the Boston district than in other New England centers. Demand is well distributed, small orders predominating.

New York — Warehouse volume gained materially during the last ten days of March, with jobber sales for that month well ahead of February. Buying is well distributed.

Philadelphia—Jobbers are adopting the new pricing plan on alloy bars, applied in most other leading warehouse districts. Otherwise, the price situation is featureless, with demand showing a mild gain.

Detroit—Warehouse business in iron and steel continues to hold at a high level and with prices unchanged. If, as indicated, some manufacturers return to mid-year model changes second quarter business will be seasonally improved.

Cincinnati—An upturn in demand for structural steel from warehouse, and heavy sales of sheets, aided in putting March sales considerably ahead of February. Prices are unchanged.

St. Louis—Interruption to iron and steel warehouse business resulted from the late March blizzard, but otherwise the steady expansion of recent weeks continues. Demand for sheets, including rustless material, shows especially marked improvement.

Metallurgical Coke

Coke Prices, Page 55

Both grades of foundry beehive coke continue unchanged with the market on common grades $4.25, Connellsville ovens, and on premium $5 with certain allowable deductions

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on the latter. Furnace coke holds at $3.25 for yearly contracts and at $3.50 for spot shipment.

With domestic demand falling away rapidly, the coke market has been forced to depend upon metallurgical grades and demand at Pittsburgh has been fairly well sustained.

Foundry coke shipments at Chicago during March were 50 to 60 per cent heavier than in February, due largely to increased foundry schedules. While the April market has yet to be announced, prices are expected to continue $8.50 for outside delivery and $9.25, delivered Chicago.

By-product coke interests at St. Louis report no decrease in sales and shipments. Deliveries to melters in March will be the largest for any month this year, and more than double the month a year ago. The price remains unchanged at $9.25, delivered in St. Louis.

Equipment

Pittsburgh — Work on Wheeling Steel Corp.'s new tin mill at Yorkville, O., is proceeding with several contracts having been awarded recently. The company is consolidating some of its present mill facilities at West Wheeling, W. Va., and at Steubenville, O., in the new building. As first reported in STEEL (Jan. 8, p. 40) Mesta Machine Co., West Homestead, Pa., was awarded the five stands of small 4-high rolling units. Electrical equipment was divided between General Electric Co. and Westinghouse Electric & Mfg. Co. Makers of ingot molds report a steadily expanding demand for their product and steel mill rolls are in good demand. The Diescher tube mill being installed at Allenport, Pa., by Pittsburgh Steel Co. is expected to be in operation in another few months.

Cleveland—No lull has been felt as yet in the steady climb of sales and inquiry for machinery and equipment, although a slight unsettling effect is anticipated from current labor difficulties. One dealer here reports March business almost 100 per cent ahead of February. Used tools are becoming scarce in face of good demand, and deliveries continue to be deferred on some new equipment.

Chicago — Quietness in equipment markets is ascribed to continued nervousness over the labor situation. While the settlement of the automotive strike is expected to mark the beginning of quieter labor relations, equipment markets have yet to recover. Sales and inquiries the past two weeks have fallen below the volume of early March. A few railroads are more active in the machine tool market, Louisville & Nashville closing bids April 2 on a list of 18 items, while the St. Louis-San Francisco road is considering the purchase of ten tools.

Boston — Incoming business to New England machinery and equipment building shops varies little. The Worcester district plants, notably makers of grinding equipment, are generally active. Recent threats of labor troubles in the automotive centers, however, slowed up negotiations on some tools. Newport, R. I., continues to be the delivery point for a fair volume of machinery for the navy, including five turret lathes and three automatic screw machines, bids closing this week.

New York — While Russia has bought some machinery for an airplane plant for which a nearby airplane builder is assisting in engineering details as to equipment and airplane models to be produced, the bulk of heavy buying by the Soviet is expected later. Domestic orders are unchanged with little new inquiry out. Navy inquiry, however, is active on both the east and west coasts.

Iron Ore

Iron Ore Prices, Page 56

Cleveland—Lake Superior iron ore producers have been asked by the Ford Motor Co. to submit prices on 50,000 tons of nonbessemer ore by April 10. This is practically the only tonnage up for figures in the open market. The Ford company has a contract to obtain some of its ore requirements from the new operators of the Blueberry mine, which it relinquished last fall. It buys ore at upper lake ports. Lake seamen's wages, and hence carrying charges have not been established for the season; mine wages may share in the general steel wage advance.

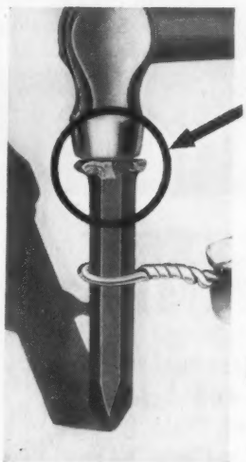
The iron ore tax in Minnesota, in which the producers are joined in endeavoring to prove that the state commission's assessments are confiscatory, is scheduled for trial May 2.

Cold Finished

Cold Finished Prices, Page 55

Pittsburgh—Removal of a strike threat in the automotive industry has strengthened trade in cold-finished

SAFETY STEEL STAMPS



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steel. March shipments and specifications were about equal to those of February. The price continues 2.10c, base, Pittsburgh, 2.15c, Cleveland, 2.20c, Buffalo and 2.30c Detroit.

Quicksilver

New York—Quicksilver prices are steady at $76, a virgin flask of 76 pounds, in small lots, with round lots reported available at $75.50. Sales are light.

Nonferrous Metals

Nonferrous Metal Prices, Page 56, 57

New York—Sentiment improved in the nonferrous metals last week as the automotive strike threat cleared and the copper industry agreed on a code. Some metals moved in better volume.

Copper—The industry finally came to an agreement on a code last week after six months of negotiation. The code provides for sales quotas and freezing of surplus stocks but does not name a minimum price for the metal. Consumers came into the market for larger tonnages late in the week with the aggregate volume reported the heaviest in some time. A price rise appeared in prospect as the week closed.

Zinc—Demand was slow and prices settled further by $5 a ton to the basis of 4.30c, East St. Louis, for prime western metal. Consumers are understood to have placed bids for substantial tonnages at 4.25c and it was thought likely the market would go to that level.

Lead—Demand continued relatively more active than for any of the other leading nonferrous metals. Bulk of the buying was for April delivery but some also was for May.

Tin—Buying was somewhat more active after midweek with Straits metal pushing to above the 55-cent level. March tin deliveries were the heaviest since last October at 3835 tons compared with 2940 in February and 3330 a year ago. Warehouse stocks also were lower.

Antimony—Demand was dull but prices held fairly well.

Aluminum—Remelt grades were steady. Virgin metal also held.

Pacific Coast

Pacific Coast Prices, Page 55, 56, 58

San Francisco—(*By Air Mail*)—The movement of iron and steel products is well sustained although most awards are small. Bids on four tunnels for the Fort Peck dam in Montana will be opened April 11, covering over 11,000 tons of plates, shapes, strip steel and reinforcing steel bars.

Concrete bar awards in the week aggregated 1445 tons, bringing the total for the year to 21,440 tons, compared with 8423 tons for the corresponding period in 1933. Soule Steel Co. took 118 tons for highway work in Tulare county, California, Unnamed interests booked 216 tons for widening of the American river bridge at Sacramento, Calif., and 117 tons for a crossing in Los Angeles county, California, for the state. San Diego, Calif., will take bids April 9, on 260 tons for the El Capitan dam reservoir. R. G. Meyler Corp., Los Angeles, was awarded a contract for 200 tons for two 200-horsepower boilers for Mare Island, Calif., that formerly was placed with the Alta Electric & Mechanical Co., San Francisco.

Demand for structural shapes continues active. Unnamed interests took 356 tons of piling for widening the American river bridge at Sacramento, Calif. Bids have been opened on 700 tons and also on 2210 tons of reinforcing bars for the Broadway tunnel, Oakland, Calif.

The United States Pipe & Foundry Co. took the only award of size this week for cast iron pipe, 119 tons, for the East Bay municipal utility district, Oakland, Calif.

Large Tonnage Pending

Seattle—Pending tonnages of shapes and reinforcing bars in the Pacific Northwest are largest in two years. It is estimated that prospective projects should result in awards for 20,000 tons before July 1.

Five coast bridges in Oregon call for a total of 7300 tons of carbon, silicon and cast chromium structurals, 100 tons of machinery and over 5000 tons of reinforcing steel. The Douglas bridge in Alaska will take 1200 tons, while 500 tons are required for immediate state bridge jobs in Washington. Seattle projects set for quick action call for 1400 tons of concrete bars. Tacoma's water system extension, which will need a large tonnage of plates, is expected up for figures within three months.

Bids for the first of the Oregon bridge jobs, the Alsea project, will be opened at Portland, Oreg., April 5, 150 tons of shapes, and 1000 tons of reinforcing steel. Bids have been tentatively called for the four other spans as follows: April 26, Coos Bay, 1708-foot cantilever span, 3970 tons of shapes and 1804 tons of reinforcing; May 17, Yaquina bay, 2350-foot arch spans, 2105 tons of shapes and 1125 tons of concrete bars; June 7, Umpqua river, swing spans, 715 tons of shapes, 53 tons of machinery and 650 tons of reinforcing; Siuslaw river, 309 tons of shapes, 43 tons of machinery and 525 tons of reinforcing.

Fibreboard Co. Inc., Port Angeles, Wash., has awarded to Chicago Bridge & Iron Works, Chicago, the

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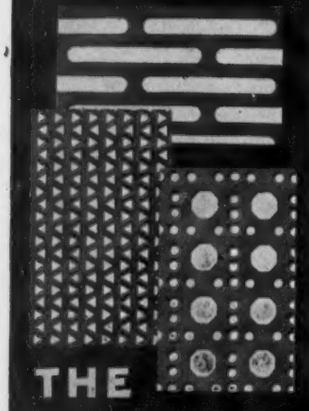

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contract for a digester. Other new equipment and improvements are planned.

Jobbers report March volume already in excess of January or February.

Steel in Europe

Foreign Steel Prices, Page 58

London—(*By Radio*) — Improvement in the steel and iron industries continues and the outlook is encouraging. Export trade is low but prospects for Russian and Chinese buying is satisfactory. Galvanized sheets and tin plate are much depressed.

The Continent reports export demand is quiet. Belgium has taken some Russian contracts and France has booked some orders for light sheets. Berlin reports that South American markets show improvement.

Production

(*Continued from Page* 13)

result of recent orders from the Pennsylvania railroad.

Pittsburgh—Steel ingot schedules in district plants last week more than recouped their loss of the week previous by advancing 3 points to 36 per cent. With another rail rolling scheduled for this week, steel production will be up to 38 per cent, the highest for the year. Owing to an expected rush of specifications when price advances are named this week, steel ingot schedules are expected to advance for at least the next two or three weeks.

Reflecting a gain of two furnaces, 20 out of 60 steelworks blast furnaces now are blowing here. Jones & Laughlin Steel Corp. blew in 1 Aliquippa, Pa., furnace last week, making 4 of its 11 stacks active, and Bethlehem Steel Co. blew in another Cambria furnace at Johnstown, Pa., making 4 of 7 blowing there. Other rates continue unchanged with Carnegie operating 9 out of 32 and American Steel & Wire Co., Pittsburgh Steel Co., and Pittsburgh Crucible Steel Co., 1 out of 2 each.

Chicago—Continued at 48½ per cent. Prospects are more favorable for an upturn but with only slight changes in the immediate future anticipated. Eleven active steelworks blast furnaces out of 36 represent no change from a week ago.

Buffalo—Unchanged at 52 per cent last week, but the rate is expected to decline 2 points to 50 per cent this week, with 19 out of 38 open hearths in production. Uncertainty continues to be reflected in the general attitude of steelworks executives and causes them to decline to predict future operating schedules.

Detroit — Unchanged at 100 per cent as all open hearths in the district continue in operation.

Wheeling — Steel ingot melting schedules advanced 3 points last week to 69 per cent, with activity in 27 out of 39 open hearths in the district. Six blast furnaces still are in operation here by two producers.

Birmingham—Held at 52 per cent last week. Tennessee Coal, Iron & Railroad Co. has nine open hearths producing ingots at Fairfield and Ensley, and Gulf States Steel Co. is operating three and four at Gadsden. Supplemental orders from railroads are again reported among other anticipations and rail making may continue for some time yet.

New England—Declined 2 points to 69 per cent last week as expected gain at one works failed to materialize. This same works, however, will increase its rate starting this week, indicating a several point advance.

Cleveland-Lorain—Down 10 points to 72 per cent, with Corrigan, McKinney Steel Co. operating 11 open hearths; Otis Steel Co., six; and National Tube Co., Lorain, continuing with 11. A further reduction is indicated for this week when Corrigan, McKinney may reduce its active units to eight. Yards stocks of ingots are large.

Central eastern seaboard—Up 1½ points to 34½ per cent last week. Indications point to a further gain this week, with general specifications coming out more freely.

Labor

WHEN 250 representatives of 51 lodges of the Amalgamated Association of Iron, Steel and Tin Workers in the tri-state district around Pittsburgh met March 25 a distinct line of cleavage developed between old and new members. Spokesmen for the former objected to any discussion of strikes, while the younger element strenuously fought for a vote. None was taken.

¶A decision in federal court at Springfield, Ill., last week stopped picketing at the Laclede Steel Co., Alton, Ill. This is the first decision of any importance given by any fed-

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eral judge on the Norris "yellow dog" contract act and probably will be the basis for future decisions in federal court.

¶National labor board decided the case lodged against the Great Lakes Steel Corp. by the Amalgamated Association of Iron Steel and Tin Workers as follows: Discharge of two employes for alleged union activity found a violation of section 7A of NIRA and the men ordered reinstated. Two other workers recommended placed on a preferential list for re-employment.

¶Directors of General Electric Co., Schenectady, N. Y., last week submitted to stockholders a profit sharing plan affecting all employes, now nearly 50,000. Directors would be given authority to set aside out of earnings available for common dividends, after deducting 8 per cent of the average book value of the common stock, an amount not to exceed 12½ per cent of the remainder of such earnings. This sum will be extra compensation.

Financial

GENERAL ELECTRIC CO., Schenectady, N. Y., in its pamphlet report for 1933 shows profit available for dividends of $13,429,739, slightly below the $14,404,110 earned in 1932. Net sales billed in 1933 totaled $136,637,268, against $147,162,290 in 1932. The company spent $3,679,973 on new plant in 1933 and wrote off depreciation amounting to $6,179,511. Average number of employes during year was 41,560, and average annual earnings of these employes was $1330.

¶Ludlum Steel Co., Watervliet, N. Y., has declared the full quarterly dividend on its 6½ per cent preferred stock payable April 11 to preferred stockholders of record April 7.

¶Union Carbon & Carbide Corp., New York, reports net earnings of $14,172,927 in 1933, after all charges, compared with net income of $8,781,426 in 1932. Current assets at the end of 1933 were $70,229,925. Book value of land, buildings, machinery, equipment, etc., last Dec. 31 was $219,451,788.

¶At the annual meeting of stockholders of National Steel Corp. in Pittsburgh March 26, all directors were re-elected. Lacking a quorum of directors, action on election of officers was deferred until the next regular board meeting, April 10, when dividend action will also be taken.

Chairman Ernest T. Weir commented briefly on the pamphlet report mailed to the stockholders 15 days ago. A resolution by stockholders commending the action of the company's management throughout the trying period of controversy with the national labor board was unanimously approved.

¶Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., reports net loss of $363,242 in 1933, after all charges, against net loss of $956,312 in 1932.

PWA

PUBLIC works loans to railroads are claimed by Washington to have increased freight car buying 900 per cent, locomotive orders 500 per cent, and passenger car awards 5400 per cent over all 1933. The full effect of these increases is yet to be felt by equipment builders, steel, and other supply industries.

A comparison of equipment business for the past five years with 1934 to date reveals this improvement.

Year	Freight cars	Passngr. cars	Locomotives
1929	106,105	2303	1055
1930	54,146	667	596
1931	10,694	11	230
1932	1,739	39	17
1933	2,460	6	39
1934 (to date)	22,045	324	176

Details of PWA-financed purchases, not including equipment privately financed, follows:

Chesapeake & Ohio, 7800 freight and 26 passenger cars; Erie, 3725 freight and 125 passenger cars; Lehigh & New England, 500 freight cars; Nickel Plate, 1300 freight and 8 passenger cars; Pennsylvania, 7000 freight cars; Baltimore & Ohio, 820 freight cars; Boston & Maine, 31 passenger cars; Central of Georgia, 200 coal cars; St. Paul, 75 passenger cars; Lackawanna, 500 hopper cars; Gulf, Mobile & Northern, 200 freight and 8 passenger cars; New Haven, 50 passenger cars; Savannah & Atlanta, 100 box cars; total 22,045 freight and 324 passenger cars.

PWA-financed locomotive business including allotments made but not yet placed lists 101 electric for Pennsylvania, 20 steam for Nickel Plate, 10 steam for Northern Pacific, 3 steam for Pittsburgh & West Virginia, 5 steam for Lehigh Valley, 10 steam and 1 diesel for Boston & Maine, 20 steam and 5 diesel for Lackawanna, and 1 diesel for Midland Continental.

Died:

FREDERICK A. GEIER, 67, pioneer Cincinnati machine tool builder and president of the Cincinnati Milling Machine Co., at his home in Cincinnati, March 27. He was one of the founders of the National Machine Tool Builders association and its president in 1910 and 1911. Some years earlier, in 1901, he aided in the organization of the National Metal Trades association. He was a director in numerous organizations in the vicinity, including the Cincinnati Bickford Tool Co. Prominent in civic life, he was a member as well of a number of technical societies.

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Alton Farrel, 54, treasurer, Farrel-Birmingham Co. Inc., Ansonia, Conn., March 28.

□ □ □

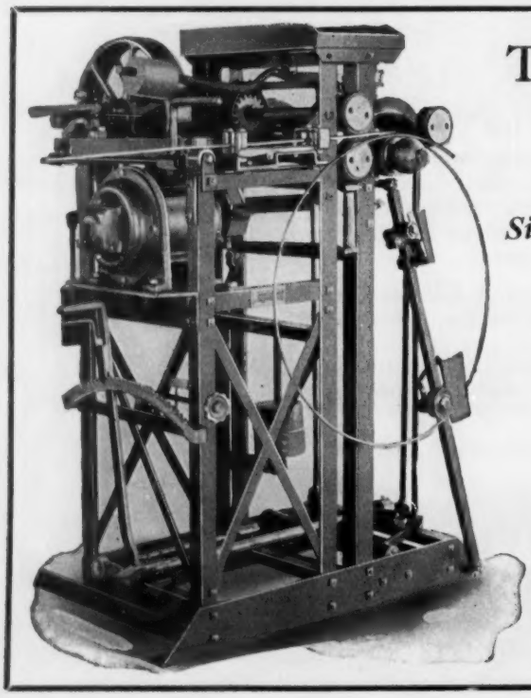
Issac Moskowitz, 59, president of Moskowitz Bros., Cincinnati, dealers in scrap metals for 32 years, at his home in Cincinnati.

□ □ □

A. L. MacGregor, 70, secretary and assistant auditor of the Pittsburgh Steamship Co., Cleveland, in that city, March 27.

□ □ □

Lloyd F. Ross, 26, formerly with the Skinner & Eddy Shipbuilding Co.,



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Seattle, at his home in that city, recently.

□ □ □

George W. Reese, prominent in western Pennsylvania industrial circles and said to have introduced the silica brick process in this country, in Kittanning, Pa., March 24.

□ □ □

Benjamin F. Davis, 89, prominent Lansing, Mich., banker and industrialist and organizer of the Lansing Wheelbarrow Co., now the Lansing Co., at his home in that city, recently.

□ □ □

Thomas Frank Dryden, 60, Toronto, Ont., manager of the Canadian Westinghouse Co. Ltd., in Toronto, March 23. A native of Ontario, he was a former member of the Westinghouse company's Buffalo office staff.

□ □ □

Harold I. Ingersoll, secretary of the Ingersoll Milling Machine Co., Rockford, Ill., and son of the founder of the company, in Pasadena, Calif., March 27.

□ □ □

James E. Woodbridge, 69, retired machinery manufacturer, in New York, recently, on his way from Florida to his home in Bronxville, N. Y. At one time he owned a controlling interest in the Pratt & Whitney Co., Hartford, Conn.

□ □ □

Burt D. Thompson, associated with the engineering department of Chrysler Corp., Detroit, in Birmingham, Mich., March 27. He formerly handled sales of machinery for the Chas. Strelinger Co., Detroit, and at one time was superintendent of the National Tool Co.'s Detroit branch.

□ □ □

Earl C. Brown, 50, vice president of the Mississippi Valley Structural Steel Co., Chicago, and manager of its St. Louis plant, in the latter city, March 28. He was graduated from the University of Illinois in 1907 and had been identified with the Misissippi Valley company since that time.

□ □ □

Jared F. Reed, 72, prominent in the early days of the steel fabricating industry in Bellevue, Pa., March 24. He began his career in 1885 with the A. & P. Roberts Co., Philadelphia, was later with the American Bridge Co. and finally with McClintic-Marshall Corp. Among projects on which he was superintendent of steel fabrication were the Panama canal locks, the Hell Gate bridge, New York, and the long Beaver, Pa., bridge of the Pittsburgh & Lake Erie railroad.

□ □ □

George M. Gillette, 75, formerly of the Minneapolis Steel & Machinery Co., at his home in Minneapolis, March 17. At one time he was secretary and treasurer of the Gillette-Herzog Mfg. Co., sold to the United States Steel Corp. in 1901. Identified with the Minneapolis company for 20 years, he resigned as president in 1922, but continued as member of the executive committee and board of directors. He was known as the "father" of the Minnesota workmen's compensation law.

Men of Industry

(*Continued from Page* 19)

sity, Columbus, Dr. Robson is author of a lengthy list of technical literature on this subject.

F. M. Hartford, who formerly handled pottery-kiln engineering of the Allied company, will assume complete charge of the engineering department of the Ferro organization.

Harry E. Ebright, formerly in charge of laboratory and research work, will become an executive officer.

Glenn Hutt, recently with the porcelain enamel plant of Frigidaire Corp., Dayton, O., has joined the service staff of the Ferro company.

□ □ □

C. M. Rudel, Montreal, Que., has been elected president of Canadian Vickers Ltd.

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Edgar E. Brosius, president, Edgar E. Brosius Co., Pittsburgh, is now traveling in Germany. He will return to Pittsburgh early in April.

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R. H. Binns Jr. and S. H. Wilson have been appointed assistant general sales managers of Revere Copper & Brass Inc., with headquarters in the New York Central building, New York.

□ □ □

George A. Decker, works engineer for the Warner & Swasey Co., Cleveland, on March 23 celebrated the fifty-second anniversary of his association with the company.

□ □ □

A. E. Stevens is now chairman of the board of Frederic B. Stevens Inc., Detroit, foundry supplies.

W. H. Joseph Cluff succeeds the late Frederic B. Stevens as president. John M. Mayers is vice president, and Lyal W. Montgomery secretary-treasurer.

□ □ □

Fred Bathke, 1917 University place, St. Paul, has been appointed sales agent for the Robins Conveying Belt Co., New York, in Minnesota, western Wisconsin and northwestern Michigan.

Raymond Church, Box 114, Pleasant Ridge station, Cincinnati, will handle sales of the company's products in southwestern Ohio, southeastern Indiana and western Kentucky.

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H. W. Prentis Jr., first vice president of Armstrong Cork & Insulation Co., Lancaster, Pa., has been elected president of the company. He has been identified with the company for 27 years and began as assistant to the manager of the insulating division at Pittsburgh.

John J. Evans, who has been president since 1929 and marks his fiftieth anniversary with the company this month, was elected chairman of the board.

H. W. Clarke, second vice president, was elected first vice president and other officers were re-elected.

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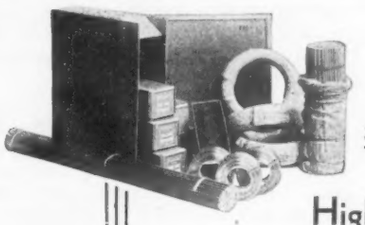
P. W. Bowers, of P. W. Bowers & Co., New York, has been elected president of the New York chapter of the Institute of Scrap Iron and Steel. Other officers elected include:



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First vice president, David Strauss, Continental Iron & Steel Co., New York; second vice president, Thomas F. Kelly, Brooklyn, N. Y.; secretary, George Betten, S. Betten & Sons, New York; and treasurer, Joseph Moskowitz, M. Samuel & Sons Inc., Brooklyn.

□ □ □

E. J. Bettendorf succeeds his father, the late J. W. Bettendorf, as president and treasurer of the Bettendorf Co., Bettendorf, Iowa, steel car builder and foundry interest.

J. H. Bendixen has been named chairman of the board of directors; he is also first vice president and manager of sales. Other officers are: Secretary, W. E. Bettendorf; assistant secretary, J. L. Miclot; and assistant treasurer, A. J. Bettendorf.

□ □ □

C. E. Weisse, service sales manager of the Warner Gear Co., Muncie, Ind., for several years, has been appointed vice president of the Borg-Warner International Corp., a new subsidiary of the Borg-Warner Corp., with headquarters in Chicago. The new organization has been formed to further export sales of products of Borg-Warner companies.

□ □ □

B. B. McCandliss, formerly treasurer of the Continental Steel Corp., Kokomo, Ind., has been elected president of the Graver Tank & Mfg. Corp., East Chicago, Ind., and the Phoenix Mfg. Co., Joliet, Ill.

George V. Malmgren has been made comptroller of the Graver company, and Philip S. Graver, formerly vice president in charge of sales, has been appointed executive vice president. Edward S. Ridgeway, formerly assistant to the vice president, has been named general manager of sales.

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C. M. Saeger Jr., physicist, United States bureau of standards, Washington, will present the annual exchange paper of the American Foundrymen's association before the Institute of British Foundrymen, London, on "Properties of Cast Red Brass as Affected by Conditions of Casting and Impurities."

□ □ □

Charles J. Nieman, secretary-treasurer of the Penn Iron & Steel Co., Creighton, Pa., was honored at a birthday testimonial, March 17, in the offices of the plant. About 200 associates and friends attended, arrangements being in charge of Wenman A. Hicks, vice president in charge of operations for the company. It was Mr. Nieman's sixty-fourth birthday.

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New York

BROOKLYN, N. Y.—Academy Scrap Iron & Metal Co., 771 Atlantic avenue, has been organized by Edward Peckelis.

ELMIRA, N. Y.—Utilities Foundry Corp. has been organized to manufacture castings, tools and other specialties, by Lawrence S. Hess, 726 Winsor avenue, and G. A. Skelly, 108 Chestnut street, Elmira, N. Y.

JAMESTOWN, N. Y.—Plans to rehabilitate the financial condition of the Jamestown Metal Desk Co. have been approved by receivers and await sanction by the federal court. The plant would be continued in operation on a backlog of orders said to total more than $1,350,000.

NEW YORK—Art Metal Die Cutting Co. will establish its plant at 115 West Twenty-ninth street, where it has leased space.

NEW YORK—Gratan Architectural Iron & Bronze Co. Inc. has been organized by Harry Cohen, 950 Woodycrest avenue, Bronx, New York, and associates, to manufacture ornamental bronze and iron and other metal specialties.

NEW YORK—Titanium Pigment Co., 111 Broadway, is planning construction of a plant on a 400-acre site at Sayreville, N. J., to include machine shop, pumping station and powerhouse. Company is subsidiary of National Lead Co., New York. Cost is estimated at about $1,500,000.

PELHAM, N. Y.—Municipality has been granted PWA loan of $175,000 for waterworks project. M. M. Pirnie, 25 West Forty-third street, New York, is engineer.

New Jersey

LINDEN, N. J.—Lawrence Engineering & Research Corp. has obtained a plant here and will start the manufacture of aircraft engines. Charles L. Lawrence, designer of aircraft engines, is president.

Pennsylvania

BRADFORD, PA.—A. Overholt & Co., R. C. Berry, manager, plans to improve the local distillery, including new boilers, etc., at an estimated cost of $100,000.

McKEESPORT, PA.—American Acetylene Co., Leslie M. Wise, manager, has purchased a site in Versailles township and is having plans prepared for an acetylene plant.

OIL CITY, PA.—Pennsylvania Metal Products Co. has taken over the buildings and equipment of the J. C. Black Mfg. Co. on Colbert avenue, and will resume operations on a substantial scale in the near future.

PITTSBURGH—United Iron & Metal Co., Pittsburgh, has received a contract to dismantle the Mississippi Glass Co. plant at Pt. Allegheny, Pa. It is estimated about 2500 tons of scrap will be realized.

PITTSBURGH — Pittsburgh Plate Glass Co. plans to build a belt conveyor structure at Pomeroy, O., on the right bank of the Ohio river, for the purpose of transferring cement from railroad cars to barges.

PITTSBURGH—United Iron & Metal Co., Pittsburgh, has started to dismantle the Richmond Railways Co. property, Staten Island, N. Y. About 1500 tons of scrap iron and steel will be salvaged and about 700 tons of scrap copper.

TEMPLETON, PA.—Allegheny River Limestone Co. plans to improve its unloading plant, to include construction of loading docks and pile clusters.

WARREN, PA.—Plans are being drawn for a new building to house women patients and also for a new laundry

for the Warren state hospital. Cost is estimated at more than $320,000.

WEST CHESTER, PA.—City has been granted loan of $49,000 for improvements to water works, coagulating basin, pumping equipment and extension to distributing system.

Ohio

CANTON, O.—Ohio River Power Co. has applied for federal permission to build additional aerial transmission lines at Philo, O., across the Muskingum river.

DAYTON, O.—Eureka Tool & Die Co., 124 McDonough street, has let general contract to W. E. Boren, Dayton, for a 1-story addition to its plant.

FAIRPORT, O.—PWA has approved loan for $95,000 for water works improvements.

LOGAN, O.—City has been granted a loan of $94,000 for improvements to water works.

MONTPELIER, O.—Village has been granted PWA loan of $12,600 for a turbo-generator.

NEWTON FALLS, O.—Falls Steel Tube Co. will build an addition, 50 x 150 feet, to its plant to take care of increased business. The addition will house sawing and patching equipment.

YOUNGSTOWN, O.—Aluminum Co. of America, Pittsburgh, is moving some equipment from its Buffalo plant to the plant of the General Fireproofing Co., here, in preparation for transferring production of certain types of aluminum chairs to the latter plant.

Michigan

DETROIT—Chevrolet Motor Co. has awarded a contract for additions and alterations at its gear and axle plant on Holbrook street, Detroit.

DETROIT—Hydro-Stamping & Mfg. Co., 5727 Mt. Elliott, has been incorporated with $10,000 capital to do metal stamping, by Hans G. Warnke, 6126 Bishop avenue, Grosse Pointe, Mich.

DETROIT—General Steel Treating Co. has been formed with $50,000 capital to conduct a plant for heat treating steel, taking over a company of the same name at 1036 Beaubein street. Peter Kypros, 606 Canto avenue, is in charge.

FLINT, MICH.—AC Spark Plug Co. will take bids at once on a 1-story addition 145 x 250 feet, to cost about $60,000.

GRAND RAPIDS, MICH.—Leonard Refrigerator Co., J. H. Deenan engineer, is having plans made for a 2-story addition 200 x 450 feet, to cost about $60,000.

LANSING, MICH.—Wohlert Corp., manufacturer of automobile parts, has purchased property adjacent to its plant for future expansion.

Illinois

CHICAGO—Hurley Machine Co., West Twenty-second and South Fifty-fourth avenue, has purchased the buildings and equipment of the Meadows Mfg. Co., Bloomington, Ill.

CHICAGO—Crowe Name Plate Mfg. Co., 3739 North Ravenswood avenue, manufacturer of metal specialties, has let contract to Robert Goldie, 19 South LaSalle street, for an addition, one story, 45 x 55 feet. George W. Klewer is architect.

HARDIN, ILL.—City has been allotted $42,000 by PWA for waterworks. Beard Engineering Co., 44 South Central avenue, Clayton, Ill., is engineer.

District of Columbia

WASHINGTON — Department of interior, 6111 Interior building, will open bids April 5 for chemistry building, 190 x 112 feet, for Howard university, to include $70,000 for equipment, Albert I. Cassell, Howard university, 2401 Sixth street, northwest, is architect.

WASHINGTON—Bureau of supplies and accounts, navy department, will open bids April 6, as follows: Schedule 2031, motor-driven pipe-cutting and threading machines; schedule 2045, three motor-driven automatic screw machines, for delivery to Newport, R. I.; April 10, schedule 2055, motor-driven hacksaws, for delivery at Mare Island, Calif.; schedule 2059, two gasoline engine standard gage locomotives, delivery at Mountain View, Calif.

Florida

PERRY, FLA.—Perry Wood Products Co. has program of repairs under way and will install new machinery at plant of Graham-Paige Automobile Body Corp. H. Pancoast is superintendent.

Georgia

ROSSVILLE, GA.—Mabry Bros., M. Mabry, secretary, will build a 2-story machine shop to cost $40,000.

Maryland

EAST BROOKLYN, BALTIMORE—Mexican Emulsion Co. will erect plant adjoining East Brooklyn unit of Mexican Petroleum Corp. and will install six tanks, pumps, and motors. Plans and specifications have been prepared by F. L. W. Moehle & Associates, 201 West Franklin street, Baltimore.

Tennessee

KNOXVILLE, TENN.—City, W. W. Mynatt, city manager, received PWA loan and grant of $2,600,000 to build electric distribution system.

MEMPHIS, TENN.—United States

GOOD USED EQUIPMENT

For

DIE CASTING
FORGING INDUSTRY
MACHINE SHOPS
POWER PLANTS
ROLLING MILLS
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and
ALLIED INDUSTRIES
STRUCTURAL,
BOILER
and
TANK INDUSTRY

CRANE

5-Ton SHEPARD Overhead Electric Traveling, 52' 4" span, 230 volt DC, also equipped for bucket & magnet operation. 350 feet of Double "A" Frame Runway.
AIR COMPRESSOR—3000 Cu. Ft., 100 lb. pressure. Plate Valve. Two Stage. Cylinder sizes 32" & 19" x 24". Direct driven motor on shaft, 600 HP, 3 ph., 60 cy. G. E. Synchronous. Belted Exciter. Complete operating panelboard. Latest type. Used about one year.
BENDING ROLL—10' 2" CLEVELAND Pyramid Type. 1/2" cap. Rolls 11" and 8" dia. Drop end housing. Motor drive.
FURNACE—500-lb. MOORE Rapid 'Lectromelt for electric steel melting, 3 phase with complete electrical equipment including Transformer, 2200 to 120 V. AC.
GENERATOR—TURBINE—G. E. Type ATB-2-1875, KVA 3600, Form T, Amps 2463, Speed 3600, KW 1500, 60 cy., 440 v. Direct connected to—Curtis Steam Turbine, KW 1500, Speed 3600, Form A, 3-stage, 210 lb. steam pressure, non-condensing.
PRESSES—BLISS No. 6-1/2 Straight Side, Double Crank with spring counterbalance. Belt Drive. 54" between housings. 8" stroke.
BLISS No. 12 Straight Side, Double Crank, Double Geared, Single Action. 14" stroke. Bed area 52 x 84". Shaft dia. 12" at bearings; 13" at pins. Arranged for MD and motor adjustment. Wgt. 200,000 lbs.
SWAGING MACHINES—(2) No. 7 LANGELIER, equipped with Semi-Automatic Hydraulic Feed and Automatic Pneumatic Gripping Jaws, capacity—tubing 3-1/2", solid hot 3", solid cold 2-1/4". Arranged for motor drive and equipped with direct connected Oil-Gear Hydraulic Pump.
TESTING MACHINE—50,000-lb. RIEHLE Universal. MD. Rebuilt by manufacturers and guaranteed for accuracy.
WHEEL PRESSES—300 and 400-ton CALDWELL Hydraulic, 48" between parallel bars. Direct motor driven with AC motor and Triplex Pump, Jib Crane and Hoist.

In addition to the above, we have available a wide variety of good equipment in various types and sizes.

Manufacturing RITTERBUSH & COMPANY, INC. Equipment
30 CHURCH ST.
NEW YORK CITY

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ACETYLENE
Linde Air Products Co., 30 E. 42nd St., New York City.

ACIDS (Pickling)
American Chemical Paint Co., Ambler, Pa.

AIR COMPRESSORS—See COMPRESSORS (Air)

ALLOYS—See FERROALLOYS

ANGLES, CHANNELS—See BEAMS, CHANNELS, ANGLES

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Bethlehem Steel Co., Bethlehem, Pa.
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Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.

BABBITT METAL
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BANDS—See HOOPS AND BANDS

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Bethlehem Steel Co., Bethlehem, Pa.
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Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.
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Republic Steel Corp., Youngstown, O.
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Kardong Bros., 346 Buchanan St., Minneapolis, Minn.

BARGES (Steel)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
McClintic-Marshall Corp., Bethlehem, Pa.

BARRELS (Plating)
Udylite Process Co., 3953 Bellevue Ave., Detroit, Mich.

BARS (Alloy)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tube Co., Canton, O.

BARS (Concrete Reinforcing)
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Illinois Steel Co., 208 S. LaSalle, St., Chicago, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
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Youngstown Sheet & Tube Co., Youngstown, O.

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Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
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Bethlehem Steel Co., Bethlehem, Pa.
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Hyatt, Roller Bearing Co., P. O. Box 476, Newark, N. J.
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BEARINGS (Roller)
Bantam Ball Bearing Co., The, South Bend, Ind.
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Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
Timken Roller Bearing Co., The, Canton, O.

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Bantam Ball Bearing Co., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
Ryerson, Jos. T. & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Timken Roller Bearing Co., Canton, O.

BEARINGS (Thrust)
Bantam Ball Bearing Co., The, South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Timken Roller Bearing Co., The, Canton, O.

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Kardong Bros., 346 Buchanan St., Minneapolis, Minn.
Morgan Engineering Co., The, Alliance, O.
Thomas Spacing Machine Co., Pittsburgh, Pa.

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Koppers Construction Co., 1301 Koppers Bldg., Pittsburgh.
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BILLETS (Alloy and Carbon Steel)
Alan Wood Steel Co., Conshohocken, Pa.
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Alan Wood Steel Co., Conshohocken, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. La Salle St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
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Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
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Illinois Steel Co., 208 S. La Salle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Standard Steel Works Co., Burnham, Pa.
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BLAST FURNACE SPECIALTIES
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.

BLAST FURNACES—See FURNACES (Blast)

BLOCKS (Chain)
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

BLOWERS
General Electric Co., Schenectady, N. Y.
Strong, Carlisle & Hammond Co., The, 1394 W. 3rd St., Cleveland, O.

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Murray Iron Works Co., Burlington, Iowa.

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Bethlehem Steel Co., Bethlehem, Pa.
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Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
Republic Steel Corp., Upson Nut Div. 1912 Scranton Rd., Cleveland, O.
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BOXES (Annealing)
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Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

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Clark, The, Controller Co., 1146 E. 152nd St., Cleveland, O.
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Botfield Refractories Co., Swanson and Clymer Sts., Philadelphia, Pa.
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BRICK (Insulating)—See INSULATING BRICK

engineer office will receive bids April 5 for furnishing labor, materials and constructing 64 steel dredge pontoons.

MEMPHIS, TENN.—United States engineer office, P. O. Box 97, will receive bids until April 10 for constructing and delivering to United States Engineer supply and repair depot one steel hull with steel deckhouse for dredge OMEGA.

Virginia

RICHMOND, VA.—Richmond Dairy Co., 314-332 North Jefferson street, is installing complete new equipment in its ice cream plant, including automatic packaging machinery for all size packages; hopper and conveyor system by Mojonnier Bros.; and refrigerated coils and insulation by Virginia Ice Machinery Corp., Richmond, Va.

SANDSTONE, VA.—PWA has approved loan and grant of $73,000 for constructing water system in sanitary district No. 2, Henrico county. R. Stuart Royer, Builders Exchange building, Richmond, Va., is consulting engineer.

Missouri

CLARKTON, MO.—City will soon take bids on a 50,000-gallon tank on 125 foot tower, vertical turbine pumps, and pump house. W. A. Fuller Co., 2916 Shenandoah avenue, St. Louis, is engineer.

JEFFERSON CITY, MO.—Loan and grant of $835,000 for waterworks has been approved by state and has been forwarded to PWA for final approval. Burns & McDonnell Engineering Co., 107 West Linwood boulevard, Kansas City, Mo., is engineer.

MOBERLY, MO.—City, Marion E. Lamb, city attorney, will vote April 24 on bonds for $700,000 to construct power and light plant.

Texas

AMARILLO, TEX.—Shamrock Oil & Gas Co. has awarded general contract to Stearns-Roger Mfg. Co., Denver, Colo., for addition to McKee absorption gasoline plant in Moore county. Addition will substantially double capacity of plant, and more absorbers, larger still, additional heat exchange and preheating equipment, new cooling tower, pumps, additional storage and accessories will be purchased.

Wisconsin

BURLINGTON, WIS. — Industrial Lubrication Co., 606 West Wisconsin avenue, Milwaukee, has moved its plant and offices to Burlington, Wis., occupying one floor of the Security building, Pine street. The concern began business three years ago, manufacturing a new all-purpose lubricating device.

MADISON, WIS.—Fauerbach Brewing Co., 651 Williamson street, has placed an order with Heil Co., 3000 West Montana street, Milwaukee, for welded steel tanks, vats, etc., for $25,000 improvement and enlargement of beer storage warehouse.

MILWAUKEE—Stopler Steel Products Co., 3258 West Fond du Lac avenue, manufacturer of metal stampings and automobile accessories, will build a 2-story addition, 50 x 60 feet. C. A. Kleppe & Sons, 239 West Center street, is general contractor.

JANESVILLE, WIS. — George De Bruin, receiver of the Northern Conveyor & Mfg. Co., 327 West State street, Janesville, Wis., has announced a creditors' sale, April 2, covering all machinery, buildings and accounts receivable.

Minnesota

GLENWOOD, MINN.—City will hold election April 17 to vote on $140,000 bond issue for the construction of a municipal power plant. J. H. Thoreson is city clerk. Burlingame & Hitchcock, 526 Sexton building, Minneapolis, are consulting engineers.

MINNEAPOLIS — Campbell Machine Co., 2845 Harriet avenue, W. H. Campbell, president, manufacturer of oil burners, has awarded contract for a 2-story factory addition, 40 x 84 feet.

MINNEAPOLIS — Welter Furnace Mfg. Co., Lyndale avenue, south, has been incorporated with capital of $50,000, by M. A. Nicholas and Ray Welter, to manufacture and deal in furnaces and oil burners.

MINNEAPOLIS—Arrow Head Steel Products Co., manufacturer of pistons and piston pins for automobiles, diesel engines, compressors and marine engines, will double the capacity of its plant with installation of more than $75,000 in additional machinery. F. O. Frederickson is vice president and general manager.

ST. PAUL—Northern States Power Co. plans improvements to its power plant at Third street and High bridge, including the installation of a new turbine and boiler.

Iowa

CORNING, IOWA—City council will soon take bids for erection of municipal power plant to cost $160,000. Plans call for generating equipment of three units of 225 horsepower each, power plant building, cooling pond, terminal tower, oil tanks, switchboard and electric distribution system. Vincent J. Mack is city clerk. Young & Stanley, Muscatine, Iowa, are consulting engineers.

MILFORD, IOWA—City will receive bids for erection of municipal power plant to cost $100,000. Buel & Winter Engineering Co., 503 Insurance Exchange building, Sioux City, Iowa, is consulting engineer.

Arizona

WILLIAMS, ARIZ.—City has voted $87,000 for waterworks, including filter plant. Weiland Engineering Co., Pueblo, Colo., is engineer.

Pacific Coast

LOS ANGELES—Crown Willamette Paper Co. is building an addition to its plant here which will be equipped for the manufacture of paper bags. Production is scheduled to start in May.

SAN FRANCISCO—Shell Oil Co., Shell building, is having plans prepared by its engineering department for additions to its chemical plant at Martinez, Calif., and new equipment will be installed. Estimated cost is $250,000.

SEATTLE—Master Oil Burner Co., 3674 Fourth avenue, south, is building a factory addition, 75 x 75 feet.

SEATTLE—Century Brewing association has amended articles, increasing capital to $696,200.

SALEM, OREG.—City has been allotted $2,500,000 under PWA for waterworks. Bear & Cunningham, Spaulding building, Portland, Oreg., are engineers.

PORT ANGELES, WASH.—Fibreboard Co. Inc., Port Angeles, will add equipment and increase capacity from 36 to 54 tons per day.

PORT TOWNSEND, WASH.—Bids for construction of the government's proposed $250,000 quarantine hospital here will be opened at Washington, D. C., April 23.

TACOMA, WASH.—Columbia Breweries, 2120 South C street, has awarded contract to J. E. Wells to build a 3-story reinforced concrete cooperage addition, 73 x 55 feet.

Dominion of Canada

BRANTFORD, ONT.—Brantford hydroelectric commission has authorized $20,000 for modernization of Greenwich street substation.

FORT ERIE, ONT.—Horton Steel Works Ltd. has started a night shift in its plant here, to handle increased volume of orders.

FORT ERIE, ONT.—Williams Gold Refining Co., M. C. Williams, manager, will install an induction furnace for melting gold, among other improvements.

HAMILTON, ONT.—Dominion Foundries & Steel Co. Ltd., Hamilton, Ont., has let a contract to Frid Construction Co., Hamilton, for an addition to its furnace department, to cost over $40,000.

HAMILTON, ONT.—Pigott Construction Co. Ltd., 36 James street, has been awarded contract for a 2-story, 75 x 200-foot addition to the heat treating department of the Steel Co. of Canada's Hamilton, Ont., plant. Construction will start immediately.

WELLAND, ONT.—Dominion Foundries & Steel Co. has awarded contract for $40,000 addition to its local plant.

WINDSOR, ONT.—Windsor Elevator & Warehouse Co. Ltd., C. R. Vanatter, president, will start work soon on a 2,000,000-bushel grain elevator here to cost $1,250,000 and will be completed by Dec. 1.

WHERE-TO-BUY

BRICK (Silica)
Botfield Refractories Co., Swanson and Clymer Sts., Philadelphia, Pa.
Carborundum Co., The, Perth Amboy, N. J.

BRICK (Silicon Carbide)
Norton, Co., Worcester, Mass.

BRIDGE CRANES (Ore and Coal Handling)
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

BRIDGES, BUILDINGS, VIADUCTS, STACKS
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Belmont Iron Works, 22nd and Washington Ave., Philadelphia, Pa.
Blaw Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.
McClintic-Marshall Corp., Bethlehem, Pa.
Ohio Structural Steel Co., The, Newton Falls, O.

BUCKETS (Clam Shell, Dragline, Grab, Single Line)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Blaw Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

BUILDINGS (Steel)—See BRIDGES, ETC.

BURNERS (Acetylene)—See TORCHES AND BURNERS

BURNERS (Automatic)
Wean Engineering Co., Warren, O.

BURNERS (Fuel, Oil, Gas, Combination)
Surface Combustion Co., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.

BUSHINGS (Bronze)
Shenango-Penn Mold Co., Dover, O.

BY-PRODUCT PLANTS
Koppers Construction Co., 1301 Koppers Bldg., Pittsburgh, Pa.

CADMIUM
Udylite Process Co., 3953 Bellevue Ave., Detroit, Mich.

CADMIUM PLATING PROCESS
Udylite Process Co., 3953 Bellevue Ave., Detroit, Mich.

CAR DUMPERS
Industrial Brownhoist Corp., Bay City, Mich.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CARBIDE
Linde Air Products Co., 30 E. 42nd St., New York City.

CARD HOLDERS
Grammes, L. F., & Sons, Inc., Allentown, Pa.

CAR PULLERS and SPOTTERS
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CARS (Charging)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CARS (Industrial and Mining)
Atlas Car & Mfg. Co., 1140 Ivanhoe Rd., Cleveland.
Bethlehem Steel Co., Bethlehem, Pa.

CARS (Scale)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

CASTINGS (Acid Resisting)
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Chain Belt Co., 1660 W. Spruce St., Milwaukee, Wis.
Driver-Harris Co., Harrison, N. J.
International Nickel Co., Inc., 67 Wall St., New York City.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Alloy Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Detroit Alloy Steel Co., Foot of Iron St., Detroit, Mich.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
Reliance Steel Casting Co., 2818 Smallman St., Pitsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Treadwell Engineering Co., Easton, Pa.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

CASTINGS (Brass, Bronze, Copper, Aluminum)
Bethlehem Steel Co., Bethlehem, Pa.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Electric Steel)
West Steel Casting Co., 805 E. 70th St., Cleveland, O.

CASTINGS (Gray Iron)
Bethlehem Steel Co., Bethlehem, Pa.
Chain Belt Co., 1660 W. Spruce St., Milwaukee, Wis.
Erie Foundry Co., Erie, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Murray Iron Works, Burlington, Iowa.
National Roll & Foundry Co., The, Avonmore, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Treadwell Engineering Co., Easton, Pa.

CASTINGS (Heat Resisting)
Driver-Harris Co., Harrison, N. J.

CASTINGS (Malleable)
Chain Belt Co., 1660 W. Spruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Peoria Malleable Castings Co., Peoria, Ill.

CASTINGS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
Reliance Steel Casting Co., 2818 Smallman St., Pitsburgh, Pa.
Standard Steel Works Co., Burnham, Pa.
Treadwell Engineering Co., Easton, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.

CASTINGS (Worm & Gear Bronze)
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.

CEMENT (High Temperature)
Botfield Refractories Co., Swanson and Clymer Sts., Philadelphia, Pa.
Carborundum Co., The, Perth Amboy, N. J.
Norton Company, Worcester, Mass.
Strong, Carlisle & Hammond Co., The, 1394 W. 3rd St., Cleveland, O.

CHAIN (Draw Bench)
Chain Belt Co., 1660 W. Spruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CHAIN (Malleable)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CHAIN (Sprocket)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Diamond Chain & Mfg. Co., 455 Kentucky Ave., Indianapolis, Ind.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Peoria Malleable Castings Co., Peoria, Ill.

CHAIN (Steel-Finished Roller)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Diamond Chain & Mfg. Co., 455 Kentucky Ave., Indianapolis, Ind.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CHARGING MACHINES (Cupola)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

CHARGING MACHINES (Open Hearth)
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CHECKS (Metal)
Cunningham, M. E., Co., 107 E. Carson St., Pittsburgh, Pa.

CHIPPERS (Billet)
Bonnot Co., The, Canton, O.

CHROME ORE
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia.

CHROMIUM METAL
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

CLEANING SPECIALTIES
American Chemical Paint Co., Ambler, Pa.

CLUTCHES (Magnetic)
Magnetic Mfg. Co., Dept. TL 650 So. 28th St., Milwaukee, Wis.

COAL AND COKE
Alan Wood Steel Co., Conshohocken, Pa.
Cleveland-Cliffs Iron Co., Union Trust Bldg., Cleveland, O.
Hanna Furnace Corp., The, Detroit, Mich.
Interlake Iron Corp., Union Trust Bldg., Cleveland, O.
Pickands, Mather & Co., Union Trust Bldg., Cleveland, O.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., Youngstown, O.

COAL, ORE AND ASH HANDLING MACHINERY
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

COKE—See COAL AND COKE

COKE OVEN MACHINERY
Atlas Car & Mfg. Co., 1140 Ivanhoe Rd., Cleveland.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

COKE OVENS (By-Product)
Koppers Construction Co., 1301 Koppers Bldg , Pittsburgh.

COMBUSTION BULBS
Norton Company, Worcester, Mass.

COMPRESSORS (Air)
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
General Electric Co., Schenectady, N. Y.

CONCRETE REINFORCING BARS —See BARS (Concrete Reinforcing)

CONDUITS (Electric)
Steel & Tubes, Inc., 224 E. 121st St., Cleveland, O.
Youngstown Sheet & Tube Co., Youngstown, O.

CONTRACTORS—See ENGINEERS AND CONTRACTORS

CONTROLLERS (Electric)
Clark, The, Controller Co., 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.

CONVEYOR BELTS (High and Low Temperature)
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.

CONVEYOR (Elevating & Conveying)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

COTTER PINS
Hindley Mfg. Co., Valley Falls, R. I.

COUPLINGS (Flexible)
Clark, The, Controller Co., 1146 E. 152nd St., Cleveland, O.
Diamond Chain & Mfg. Co., 455 Kentucky Ave., Indianapolis Ind.
General Electric Co., Schenectady, N. Y.

COUPLINGS (Pipe)
Bethlehem Steel Co., Bethlehem, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, O.

CRANES, BRIDGE (Ore and Coal Handling)
Industrial Brownhoist Corp., Bay City, Mich.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CRANES (Charging)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CRANES (Creeper, Erection)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CRANES (Electric)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., Alliance, O.
Shaw-Box Crane & Hoist Co., Inc., 406 Broadway, Muskegon, Mich.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Gantry)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CRANES (Gasoline and Diesel)
Industrial Brownhoist Corp., Bay City, Mich.

CRANES (Hand)
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Industrial Brownhoist Corp., Bay City, Mich.
Shaw-Box Crane & Hoist Co., Inc., 406 Broadway, Muskegon, Mich.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Jib)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Locomotive)
Harnischfeger Corp., 411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.

CUTTING AND WELDING—See WELDING

CUTTING OILS—See Oils (Cutting)

STATISTICS OF IRON AND STEEL INDUSTRY

From dept. of commerce except shipments by U. S. Steel Corp., foundry equipment by Foundry Equip. Mfrs. assoc., river traffic by U. S. engineers at Pitts., electric power by geological survey.

U. S. Steel Corp.

1932	Automobiles: Units Production United States Total*	Automobiles: Units Production United States Passenger cars	Automobiles: Units Production Canada Total	Shipments: To consumers only, inter-company shipments not included Tons	Fabricated Shapes‡: Net Tons Bookings Tonnage	Fabricated Shapes‡: Net Tons Shipments Tonnage	Fabricated Plates: Total	Fabricated Plates: Net Tons Bookings Oil Storage Tanks	Fabricated Plates: Miscellaneous	Foundry Equipment Order Index†
Year	1,370,678	1,134,372	60,816	3,974,062	948,000	942,400	161,810	38,976	109,085	
1933										
Jan.	130,044	108,321	3,358	285,138	73,679	50,965	11,128	1,501	8,830	68.4
Feb.	106,825	91,340	3,298	275,929	50,955	46,168	16,588	8,347	7,660	16.1
March	117,949	99,225	6,632	256,793	71,398	54,948	8,903	1,270	6,787	9.8
April	180,667	152,939	8,255	335,321	46,095	50,387	9,502	2,938	6,291	19.4
May	218,303	184,578	9,396	455,302	42,600	63,968	16,243	2,858	8,183	25.7
June	253,322	211,448	7,323	603,937	81,910	64,809	37,020	20,894	14,013	45.5
July	233,088	195,019	6,540	701,322	56,482	51,303	20,058	6,013	11,417	48.6
August	236,487	195,076	6,079	668,155	78,379	67,913	16,320	2,581	10,618	56.2
Sept.	196,082	160,891	5,808	575,161	57,642	64,362	16,025	1,033	13,602	34.9
Oct.	138,485	108,010	3,682	572,897	53,695	73,139	17,839	1,434	12,162	42.46
Nov.	63,904	42,818	2,291	430,358	60,896	56,023	14,466	3,734	9,466	36.62
Dec.	84,045	52,061	3,262	600,639	83,799	56,388	13,692	2,160	9,819	43.2
Year	1,959,945	1,602,332	65,924	5,760,952	757,530	700,373	199,031	55,025	119,569	.....
1934										
Jan.	161,086	116,032	6,904	331,777	74,358	46,774	11,448	1,718	8,933	37.2
Feb.	235,376	190,253	8,571	385,500	59,307	37,330	.....	.....	.....	65.8

*Difference of total and passenger cars equals number of trucks. †Average monthly shipments, 1922-23-24 taken as 100
‡Figures by American Institute of Steel Construction, from January, 1933, 75 to 85 per cent of industry reporting.

1932	Malleable Castings: Net Tons Output	Malleable Castings: Net Tons Shipments	Malleable Castings: Net Tons Orders booked	Steel Castings: Net Tons Total bookings	Steel Castings: Net Tons Total production	Mech. Stokers: —Sales— Fire tube boilers	Mech. Stokers: —Sales— Water tube boilers	Steel Furniture: Dollars 000 omitted Business shipments	Steel Furniture: Dollars 000 omitted Shelving, shipments	Babbitt Metal: Pounds 000 omitted (a) Total production	Babbitt Metal: Pounds 000 omitted (b) Sales
Year	171,479	178,316	169,027	155,837	175,831	920	367	8,102	2,166	16,990	12,412
1933											
Jan.	12,577	14,248	12,404	14,450	15,378	55	13	582	121	1,346	1,073
Feb.	13,575	14,068	11,077	13,179	13,802	38	23	464	104	1,117	917
March	9,756	10,967	12,380	13,178	14,896	69	17	482	137	1,134	941
April	17,871	16,666	17,856	15,942	13,492	28	34	404	133	1,544	1,270
May	24,628	23,077	24,671	22,612	20,751	54	44	511	166	2,110	1,785
June	31,118	29,268	31,997	34,965	29,455	147	50	636	165	2,327	1,877
July	30,865	29,155	28,458	31,878	31,718	110	67	522	156	2,484	1,941
August	31,811	30,195	28,323	31,502	33,834	157	61	693	178	2,753	2,059
Sept.	27,078	25,402	22,744	25,220	28,087	175	28	734	163	2,419	1,803
Oct.	24,381	20,422	19,933	26,135	27,826	147	31	825	146	2,090	1,554
Nov.	21,903	19,722	20,776	25,558	24,721	142	40	799	195	1,963	1,606
Dec.	21,870	22,300	26,305	25,612	23,718	109	13	1,040	202	1,459	1,043
Year	268,617	256,419	258,082	280,231	277,678	1,231	421	7,697	1,870	22,812	17,876
1934											
Jan.	30,417	26,642	32,501	26,296	27,644	100	23	993	210	2,256	1,838
Feb.	33,939	31,412	36,594	13,179	13,802	...	..	...	...	2,147	1,715

(a) by 40 plants. (b) by 30 manufacturers who produce for sale, including 5 who also report consumption of own metal.

1932	Coke: Net Tons Production By-Product	Coke: Net Tons Production Beehive	Electric Power: Millions Kilowatt Hours Production*	Steel Barrels: Units Production	Steel Barrels: Units Shipments	River Traffic: Net Tons Allegheny	River Traffic: Net Tons Monongahela	River Traffic: Net Tons Ohio	Steel Boilers: Total	Steel Boilers: Units Stationary	Steel Boilers: Marine
Year	21,166,913	772,500	83,153	4,920,482	4,928,420	67,117	284,954	418,990	3,652	3,580	72
1933											
Jan.	1,784,527	81,900	6,932	341,382	341,055	1,627	11,724	18,002	197	189	8
Feb.	1,638,817	84,100	6,285	311,111	312,919	1,656	17,904	23,614	176	162	14
March	1,666,035	93,300	6,674	427,562	425,682	425	19,546	32,917	195	186	9
April	1,656,183	47,000	6,462	452,086	454,794	3,025	35,795	37,191	236	228	8
May	1,921,257	47,300	6,996	531,304	531,921	4,400	39,890	46,038	328	307	21
June	2,241,432	50,100	6,231	643,982	640,596	815	58,179	56,484	511	496	15
July	2,797,316	68,400	7,479	623,056	621,042	3,900	68,453	62,096	498	491	7
August	2,923,418	70,600	7,686	537,801	527,811	3,234	67,389	69,531	511	441	70
Sept.	2,712,050	59,500	7,347	580,471	585,842	2,000	43,026	38,480	447	442	5
Oct.	2,581,834	45,000	7,478	873,536	863,277	4,240	39,026	49,047	395	377	18
Nov.	2,334,597	92,800	7,243	638,850	644,954	1,550	28,216	39,573	296	291	5
Dec.	2,454,947	89,500	7,447	610,440	610,365	4,130	38,693	31,038	328	310	18
Year	26,722,400	829,500	85,260	6,571,581	6,560,258	31,007	467,841	509,011	4,118	3,920	198
1934											
Jan.	2,475,785	96,600	7,614	708,086	706,209	590	27,158	54,109	249	239	10
Feb.	1,638,817	84,100	....	.....	.....	520	12,429	4,373	212	198	14

*For public use.

WHERE-TO-BUY

CYLINDERS (Pressure)
National Tube Co.,
Frick Bldg., Pittsburgh, Pa.

DEOXIDIZERS
Titanium Alloy Mfg. Co.,
Hyde Park Blvd., Niagara Falls, N. Y.
Vanadium Corp. of America,
120 Broadway, New York City.

DIE BLOCKS
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co.,
945 E. 67th St., Cleveland, O.
Standard Steel Works Co.,
Burnham, Pa.

DIE HEADS
Landis Machine Co.,
Waynesboro, Pa.

DIES (Cast)
Detroit Alloy Steel Co.,
Foot of Iron St., Detroit, Mich.

DIES (Steel, Embossing)
Cunningham, M. E., Co.
107 E. Carson St., Pittsburgh, Pa.

DOLOMITE—FLUX AND REFRACTORIES
Basic Dolomite, Inc.,
845 Hanna Bldg., Cleveland, O.

DRILLING MACHINES (Multiple, Heavy Duty)
Thomas Spacing Machine Co.,
Pittsburgh, Pa.

DRILLING MACHINES (Radial)
Thomas Spacing Machine Co.,
Pittsburgh, Pa.

DRIVES (Chain)
Chain Belt Co., 1660 W. Spruce St., Milwaukee, Wis.
Diamond Chain & Mfg. Co., 455 Kentucky Ave., Indianapolis, Ind.
Link-Belt Co.,
300 W. Pershing Rd., Chicago, Ill.

DRIVES (Cut Herringbone Gears)
Lewis Foundry & Machine Co.,
P. O. Box 1591, Pittsburgh, Pa.
Mesta Machine Co.,
P. O. Box 1124, Pittsburgh, Pa.
United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

ECONOMIC SERVICE
Brookmire, The, Economic Service, Inc., 551 Fifth Ave.,
New York, N. Y.

ELECTRIC HEATING ELEMENTS
Driver-Harris Co., Harrison, N. J.

ELECTRIC WELDING—See WELDING

ELECTRICAL EQUIPMENT
General Electric Co.,
Schenectady, N. Y.

ELEVATING AND CONVEYING MACHINERY—See CONVEYORS

EMBLEMS
Grammes, L. F. & Sons, Inc.,
Allentown, Pa.

ENGINEERS AND CONTRACTORS
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The,
Alliance, O.
Wean Engineering Co.,
Warren, O.
Wellman Engineering Co.,
7000 Central Ave., Cleveland, O.

ENGINEERS (Consulting)
Perin Engineering Co., Inc.,
11 W. 42nd St., New York City.
Wean Engineering Co.,
Warren, O.

ENGINEERS, CONSULTING (By-Product Coke Oven & Gas Plants)
Koppers Construction Co.,
1301 Koppers Bldg., Pittsburgh.

ENGINEERS, CONSULTING (Open Hearth)
Buell, Wm. C., Jr.,
P. O. Box 282, Cleveland, O.

ENGINES (Steam)
Murray Iron Works,
Burlington, Iowa.

EQUIPMENT (Rebuilt)
McCabe & Sheeran Machinery Corp.,
50 Church St., New York City.
Ritterbush & Co., Inc.,
30 Church St., New York City.

FACING MACHINES (Structural)
Thomas Spacing Machine Co.,
Pittsburgh, Pa.

FANS (Exhaust Ventilating)
Propellair, Inc.,
Springfield, O.

FANS (Portable)
Perkins, B. F., & Son Co.,
Holyoke, Mass.

FERROALLOYS
Cleveland-Cliffs Iron Co.,
Union Trust Bldg., Cleveland, O.
Electro Metallurgical Sales Corp.,
30 E. 42nd St., New York City.
International Nickel Co., Inc.,
67 Wall St., New York City.
Metal & Thermit Corp.,
120 Broadway, New York City.
Ohio Ferro Alloys Corp.,
Citizens Bldg., Canton, O.
Pittsburgh Metallurgical Co.,
College and Highland Ave.,
Niagara Falls, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Titanium Alloy Mfg. Co.,
Hyde Park Blvd.,
Niagara Falls, N. Y.
Vanadium Corp. of America,
120 Broadway, New York City.

FERROCARBON (Titanium)
Titanium Alloy Mfg. Co.,
Hyde Park Blvd.,
Niagara Falls, N. Y.

FERROCHROME
Ohio Ferro-Alloys Corp.,
Citizens Bldg., Canton, O.
Pittsburgh Metallurgical Co.,
College and Highland Ave.,
Niagara Falls, N. Y.
Samuel, Frank, & Co., Inc.,
Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America,
120 Broadway, New York City.

FERROMANGANESE
Ohio Ferro-Alloys Corp.,
Citizens Bldg., Canton, O.
Pittsburgh Metallurgical Co.,
College and Highland Ave.,
Niagara Falls, N. Y.
Samuel, Frank, & Co., Inc.,
Harrison Bldg., Philadelphia, Pa.

FERROPHOSPHORUS
Samuel, Frank, & Co., Inc.,
Harrison Bldg., Philadelphia, Pa.

FERROSILICON
Ohio Ferro-Alloys Corp.,
Citizens Bldg., Canton, O.
Pittsburgh Metallurgical Co.,
College and Highland Ave.,
Niagara Falls, N. Y.
Samuel, Frank, & Co., Inc.,
Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America,
120 Broadway, New York City.

FERROSILICON ALUMINUM
Vanadium Corp. of America,
120 Broadway, New York City.

FERROTITANIUM
Vanadium Corp. of America,
120 Broadway, New York City.

FERROTUNGSTEN
Electro Metallurgical Sales Corp.,
30 East 42nd St., New York City.

FERROVANADIUM
Vanadium Corp. of America,
120 Broadway, New York City.

FLOORING (Steel)
Alan Wood Steel Co.,
Conshohocken, Pa.
Blaw Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co.,
208 S. LaSalle St., Chicago, Ill.
Inland Steel Co.,
38 So. Dearborn St., Chicago, Ill.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

FLUOR SPAR
Samuel, Frank, & Co., Inc.,
Harrison Bldg., Philadelphia, Pa.

FORGING BILLETS—See BILLETS (Forging)

FORGING MACHINERY
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp.,
Bay City, Mich.
Morgan Engineering Co., The,
Alliance, O.

FORGINGS (Drop)
Bethlehem Steel Co., Bethlehem, Pa.

FORGINGS (Iron and Steel)
Carnegie Steel Co.,
327 Carnegie Bldg., Pittsburgh, Pa.
Mesta Machine Co.,
P. O. Box 1124, Pittsburgh, Pa.
Midvale Co., The,
Nicetown, Philadelphia, Pa.
Oliver Iron & Steel Corp., S. 10th and Muriel Sts., Pittsburgh, Pa.
Standard Steel Works Co.,
Burnham, Pa.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg.,
Birmingham, Ala.

FORGINGS (Upset)
Bethlehem Steel Co., Bethlehem, Pa.

FROGS AND SWITCHES
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.

FURNACE INSULATION—See INSULATION

FURNACES (Blast)
McClintic-Marshall Corp.,
Bethlehem, Pa.

FURNACES (Electric Heating)
Electric Furnace Co., The,
Wilson St., Salem, O.
General Electric Co.,
Schenectady, N. Y.
Holcroft & Co., 6545 Epworth Blvd.,
Detroit, Mich.
Strong, Carlisle & Hammond Co.,
1392 W. 3rd St., Cleveland, O.

FURNACES (Electric Melting)
American Bridge Co.,
Frick Bldg., Pittsburgh, Pa.
General Electric Co.,
Schenectady, N. Y.

FURNACES (Forging)
Electric Furnace Co., The,
Salem, O.
Holcroft & Co., 6545 Epworth Blvd.,
Detroit, Mich.
Surface Combustion Co.,
2375 Dorr St., Toledo, O.

FURNACES (Gas or Oil)
Holcroft & Co., 6545 Epworth Blvd.,
Detroit, Mich.
Strong, Carlisle & Hammond Co., The, 1394 W. 3rd St., Cleveland, O.

FURNACES (Open-Hearth)
Criswell, James, Co.,
Keenan Bldg., Pittsburgh, Pa.
Wellman Engineering Co.,
7000 Central Ave., Cleveland, O.

FURNACES (Recuperative)
Electric Furnace Co., The,
Wilson St., Salem, O.
Holcroft & Co., 6545 Epworth Blvd.,
Detroit, Mich.

FURNACES (Sheet and Tin Mill)
Electric Furnace Co., The,
Salem, O.
Surface Combustion Co.,
2375 Dorr St., Toledo, O.
Wean Engineering Co.,
Warren, O.

FURNACES (Steel Mill)
Criswell, James, Co.,
Keenan Bldg., Pittsburgh, Pa.
Electric Furnace Co., The,
Wilson St., Salem, O.
Flinn & Dreffein Co., 308 W. Washington St., Chicago, Ill.
General Electric Co.,
Schenectady, N. Y.
Holcroft & Co., 6545 Epworth Blvd.,
Detroit, Mich.
Surface Combustion Co.,
2375 Dorr St., Toledo, O.

FURNACES (Steel Treating, Annealing and Case Hardening)
Carborundum Co., The,
Perth Amboy, N. J.
Electric Furnace Co., The,
Wilson St., Salem, O.
General Electric Co.,
Schenectady, N. Y.
Holcroft & Co., 6545 Epworth Blvd.,
Detroit, Mich.
Strong, Carlisle & Hammond Co.,
1392 W. 3rd St., Cleveland, O.
Surface Combustion Co.,
2375 Dorr St., Toledo, O.
Wean Engineering Co.,
Warren, O.

GALVANIZING PLANTS FOR SHEETS
Erie Foundry Co., Erie, Pa.
Wean Engineering Co.,
Warren, O.

GAS HOLDERS
McClintic-Marshall Corp.,
Bethlehem, Pa.

GAS PRODUCER PLANTS
Flinn & Dreffein Co.,
308 W. Washington St., Chicago.
Koppers Construction Co.,
1301 Koppers Bldg., Pittsburgh.
Wellman Engineering Co.,
7000 Central Ave., Cleveland, O.

GAS RECOVERY COKE OVEN AND GAS PLANTS
Koppers Construction Co.,
1301 Koppers Bldg., Pittsburgh.

GAUGES (Indicating and Recording)
General Electric Co.,
Schenectady, N. Y.

GEAR BLANKS
Bethlehem Steel Co., Bethlehem, Pa.
Lukens Steel Co.,
Coatesville, Pa.
Standard Steel Works Co.,
Burnham, Pa.

GEARS AND GEAR CUTTING
General Electric Co.,
Schenectady, N. Y.
Lewis Foundry & Machine Co.,
P. O. Box 1591, Pittsburgh, Pa.
Mesta Machine Co.,
P. O. Box 1124, Pittsburgh, Pa.
Burlington, Iowa.
Murray Iron Works
Burlington, Iowa.
United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

GENERATING SETS
General Electric Co.,
Schenectady, N. Y.

GENERATORS (Electric)
General Electric Co.,
Schenectady, N. Y.
Lincoln Electric Co., The,
Cleveland, O., Dept. 20-4.

GENERATORS (Plating)
Udylite Process Co.,
3953 Bellevue Ave., Detroit, Mich.

GRATING (Steel)
Blaw Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.

GREASE (Lubricating)—See LUBRICANTS (Industrial)

GRINDING MACHINES (Plain and Universal)
Norton Co., Worcester, Mass.

GRINDING MACHINES (Roll)
Mesta Machine Co.,
P. O. Box 1124, Pittsburgh, Pa.

GRINDING MACHINES (Swing Frame)
Excelsior Tool & Machine Co.,
Ridge and Jefferson Aves.,
East St. Louis, Ill.

GRINDING MACHINES (Tool and Cutter)
Norton Co., Worcester, Mass.

GRINDING WHEELS
Carborundum Co., The,
Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

HAMMERS (Drop)
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp.,
Bay City, Mich.
Morgan Engineering Co.,
Alliance, O.

HAMMERS (Steam)
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp.,
Bay City, Mich.
Morgan Engineering Co.,
Alliance, O.

HANGERS (Shaft)
Hyatt Roller Bearing Co.,
P. O. Box 476, Newark, N. J.

HARDWARE SPECIALTIES
Peoria Malleable Castings Co.,
Peoria, Ill.